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THE DEVELOPMENT OF A PROGRAMED COURSE OF STUDY IN MANUSCRIPT AND CURSIVE HANDWRITING FOR USE IN TEACHER EDUCATION.

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THE PURPOSE OF THE PROJECT WAS TO DEVELOP PROGRAMED MATERIALS FOR HANDWRITING INSTRUCTION AND TO EVALUATE THEIR EFFECTIVENESS. COLLEGE STUDENTS FROM TWO UNIVERSITIES WERE ASSIGNED TO FOUR GROUPS--TWO EXPERIMENTAL, ONE COMPARATIVE, AND ONE CONTROL. THESE GROUPS RECEIVED DIFFERENT INSTRUCTIONAL TREATMENTS. DATA WERE OBTAINED BY PRE- AND POST-TEST PROCEDURES AND BY VARIOUS RATING TECHNIQUES. PROGRAMED MATERIALS WERE FOUND EFFECTIVE IN INCREASING THE ABILITY OF PRESERVICE TEACHERS TO PROVIDE ELEMENTARY INSTRUCTION IN HANDWRITING, AND IN PROVIDING HANDWRITING MODELS FOR BOTH MANUSCRIPT AND CURSIVE STYLES. FURTHER RESEARCH WAS RECOMMENDED TO INVESTIGATE THE RELATIONSHIPS BETWEEN PROGRAM COMPLETION TIME AND KNOWLEDGE OF EDUCATIONAL METHODOLOGY. (RS)

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THE DEVELOPMENT OF A PROGRAMMED COURSE OF STUDY IN MANUSCRIPT AND CURSIVE HANDWRITING FOR USE IN TEACHER EDUCATION

Cooperative Research Project No. S-178

Emma E. Plattor

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FOR USE IN TEACHER EDUCATION

A Dissertation
Presented to
the Faculty of the College of Education
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In Partial Fulfillment
of the Requirements for the Degree
DOCTOR OF EDUCATION

by

Emma E. Plattor
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Vita

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Abstract

The primary purpose of this study was to develop and test a sequence of auto-instructional materials in the teaching of handwriting in order to answer two questions: (1) does the use of programmed learning materials as an instructional medium increase the ability of preservice teachers to provide instruction in handwriting to children at the elementary grade level? and (2) does the use of programmed learning materials as an instructional medium increase the ability of preservice teachers to provide handwriting models in both manuscript and cursive styles for children at the elementary grade level? A secondary issue upon which the study focused was: If a programmed course in handwriting instruction does teach, to what level of proficiency does it teach when compared with conventional classroom instruction?

The procedures used in this investigation included the development and administration of programmed instructional units in the teaching of handwriting. In addition, a test instrument designed to measure knowledge of educational methodology in handwriting and ability to provide manuscript and cursive handwriting models was developed. This instrument was administered to four groups of subjects enrolled in preservice teacher education programs at two universities. Of these groups, two received the programmed units, one received conventional classroom instruction, and one received no formal instruction in the teaching of handwriting.

Six null hypotheses were tested in the study. The first three dealt with the effect of programmed learning sequences on the subjects' ability to provide handwriting instruction and handwriting models in manuscript and cursive styles. The remaining null hypotheses dealt with a comparison of the effect of programmed learning sequences and conventional teaching on the subjects' ability to provide handwriting instruction and manuscript and cursive models. All of the null hypotheses were rejected.

Two major sets of data were obtained. One set consisted of pre- and posttest scores on the objective portion of the test instrument, while the other comprised the pre- and posttest ratings, by a panel of three judges, of each subject's writing of prescribed manuscript and cursive model sentences. Data concerning the time required by the subjects to complete each programmed set and unit were also collected.

Findings:

1. Objective achievement posttest scores were significantly higher than pretest scores for both groups receiving programmed instruction.
2. Posttest ratings of manuscript and cursive writing samples were significantly higher than pretest ratings for both groups receiving programmed instructon.
3. There were significant differences in objective achievement posttest scores among the groups receiving programmed instruction, conventional instructon, and no formal instruction.
4. There were significant differences in posttest ratings of manuscript and cursive writing samples among the groups receiving programmed instruction, conventional instruction, and no formal instruction.
5. Objective achievement posttest scores were significantly higher for the group receiving programmed instruction than

for the group receiving conventional instruction.

6. There were no significant differences in posttest ratings of manuscript and cursive writing samples between the groups receiving programmed and conventional instruction. However, both the manuscript and cursive posttest means were higher for the group receiving programmed instruction.
7. Objective achievement posttest scores were significantly higher for the groups receiving programmed and conventional instruction than for the group receiving no formal instruction.
8. Posttest ratings of manuscript and cursive writing samples were significantly higher for the groups receiving programmed and conventional instruction than for the group receiving no formal instruction.
9. There was a strong positive correlation between program completion time and objective achievement posttest scores for the Rochester group and a weak negative correlation for the Auburn group.

Conclusions:

1. The use of programmed learning materials is effective in increasing the ability of preservice teachers to provide instruction in handwriting to children at the elementary grade level.
2. The use of programmed learning materials is effective in increasing the ability of preservice teachers to provide handwriting models in both manuscript and cursive styles to children at the elementary grade level.

3. The use of programmed learning materials is more effective than conventional classroom teaching in increasing the proficiency of preservice teachers in providing handwriting instruction.
4. The use of programmed learning materials is as effective as conventional classroom teaching in increasing the proficiency of preservice teachers in providing handwriting models in both manuscript and cursive styles.
5. Unless preservice teachers receive instruction in the teaching of handwriting, it is clear that they develop neither knowledge of educational methodology in this area nor ability to provide handwriting models in either manuscript or cursive styles.
6. The relationship between program completion time and ability to provide handwriting instruction is not clear. It must be concluded that the inconsistent findings in this area require that judgment be suspended until further evidence is available.

Recommendations for Further Study:

1. Research designed to develop and test programmed learning sequences in the teaching of other subject areas at the elementary grade level.
2. Replication of this study with inservice teachers.
3. Investigation of the effect of the programmed materials used in this study in terms of specific individual characteristics of the learners.
4. Investigation of the relationship between program completion time variables and knowledge of educational methodology in handwriting.

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Chapter I

Introduction to the Problem

Present day concern with handwriting instruction is largely directed toward the development of power to communicate effectively through written language. Since writing is of essential importance to both literacy and communication, there is current interest throughout the world in encouraging investigations into the most effective and efficient methods of teaching children to write legibly and fluently (Harris, 1960).

While recent surveys (Freeman, 1958; Herrick & Okada, 1963) indicate that provision for formal instruction in handwriting is almost universal in the elementary schools of the United States, in most cases little or no instructional methodology in handwriting is provided in programs of teacher education (Enstrom, 1962a). Since handwriting is a significant aspect of communication, it would seem imperative that attention be given to this area by teacher educators.

Statement of the Problem

The major purpose of this study was to develop and test a sequence of auto-instructional materials in the teaching of handwriting in order to answer two questions: (1) does the use of programmed learning materials as an instructional medium increase the ability of preservice teachers to provide instruction in handwriting to children at the elementary grade level: and (2) does the use of programmed learning materials as an instructional medium increase the ability of preservice teachers to provide handwriting models in both manuscript and cursive styles to children at the elementary grade level?

One basic assumption in teacher education is that a direct positive relationship exists between the teacher's knowledge and understanding of educational method and the development of actual skill in providing instruction. It is further assumed in handwriting instruction that a direct positive relationship exists between the teacher's ability to provide appropriate handwriting models and the optimal development of children's handwriting skill. Both special subject matter knowledge and professional information are criterion measures reported in the literature as likely to correlate positively with teacher effectiveness (Ryans, 1960).

A major problem in teacher education at the elementary grade level concerns the difficulty involved in providing within the college curriculum sufficient time for the development of knowledges and skills in both content and educational method in all the subject areas which the elementary teacher must teach. Where instruction in the teaching of handwriting is provided at the preservice level, it is generally included as a very short unit within a language arts course which may also include speaking, listening, grammar, spelling, creative writing, and reading. Since students working through a programmed course in teaching handwriting can move at their own learning rate rather than at a rate controlled by external factors, it is reasonable to assume that these students will increase their knowledge of handwriting instruction at least as much as, and possibly more than, students receiving similar instruction under conventional classroom conditions.

The present study was designed primarily to determine the effectiveness of using programmed instruction as a teaching technique. The primary issues on which the study focused was: Can a programmed course of study in handwriting instruction teach preservice teachers how to provide this instruction? A secondary issue on which the study focused was: if a programmed course in handwriting instruction can teach, to what level of proficiency does it teach when compared with conventional classroom instruction?

Significance of the study

Recent surveys (Freeman, 1958; Herrick & Okada, 1963) indicate that the practice or beginning formal instruction in handwriting in the first grade with manuscript writing and then changing to cursive writing by the end of the primary grades is almost universal in American elementary schools. These surveys further indicate that the typical weekly time pattern consists of 75-100 minutes of formal instruction during the primary grades and 45-60 minutes during the intermediate and upper grades, usually in discrete skill periods of about 15 minutes in length. Additional instruction is provided when the handwriting skill is utilized in functional writing situations within the classroom.

In this dual program of handwriting instruction, children are taught two distinct types of letter forms as well as two different handwriting styles. This requires that teachers be prepared to demonstrate both the manuscript and cursive alphabets in such a way that their writing serves as a legible model for the child to use in developing his own handwriting skill. The nature of the instructional program further requires that teachers: (1) understand the purposes of handwriting instruction and develop competency in relating skill learnings in handwriting to those functional situations in which a child writes; (2) acquire skill in specifying appropriate behavioral objectives for handwriting instruction; (3) provide those instructional sequences which lead to optimal development of handwriting skill for each child; and (4) evaluate and select appropriate instructional materials and techniques.

The lack of attention given handwriting in programs of teacher education has probably contributed significantly to the general confusion which currently surrounds handwriting instruction and which has created varying points of view, varying methodologies and techniques, and little consistency in approach within and among the schools of the United States. Few teacher education institutions currently accord handwriting a place in the preservice education of teachers, despite the obvious importance of developing in the teacher the knowledge, understanding, and skill essential to the provision of effective and efficient instructional sequences in handwriting. The broadened scope of basic professional education as well as changing points of view concerning the function of handwriting may well have precluded the provision of sufficient time for appropriate consideration of the teaching of handwriting.

Programmed instruction offers a methodology through which instruction in the teaching of manuscript and cursive writing can be provided on an individual basis to preservice teachers. Since emphasis in the development of programmed materials is placed on the achievement of behavioral, observable, and measurable objectives, these materials further provide models which assist the preservice teacher in preparing teaching objectives in handwriting which are measurable and observable in terms of student performance.

Definition of Terms

Specific terms as used in this study are defined as follows:

1. Auto-instructional programming (Lysaught & Williams, 1963, p. 2)--the process of arranging materials in a series of small steps designed to lead a student through self-instruction from what he knows to the unknown of new and more complex knowledge and principles. Throughout this study, the terms auto-instructional program, self-instructional program, programmed learning, and programmed instruction will be used interchangeably.
2. Behavioral objectives (Mager, 1962, p. vii)--the goals of an instructional program communicated by statements which describe the pattern of behavior or performance to be demonstrated by the learner upon completion of the program.
3. Characteristics of programming (Lysaught & Williams, 1963, pp. 16-18)--distinguishing marks of an auto-instructional program which include: defined assumptions, defined objectives, a logical sequence of small steps, active responding by the learner, immediate feedback of information to the learner, individual rate of learning, and constant evaluation.
4. Cursive handwriting--a style of handwriting in which the letters are composed of a variety of curved and slanted strokes including beginning, connecting, ending, and loop strokes. The writing is slanted. The strokes in each letter are joined and the writing instrument is not lifted between strokes in a letter or between letters in a word.

5. Manuscript handwriting--a style of handwriting in which the letters are composed of circles or parts of circles and straight lines. The writing is not slanted. The strokes in each letter are separate and the writing instrument is lifted after each stroke in a letter and after each letter in a word.
6. Programming cycle--(Lysaught & Williams, 1963, pp. 24-26)--a recommended procedure or series of steps to be followed in constructing a program. This includes the selection of a unit, description of the learners, statement of objectives in behavioral terms, selection of a model or paradigm, the ordering of the items in the sequence, construction of the items, initial field testing, evaluation and revision.

Hypotheses

Six null hypotheses were investigated in this study. The first three dealt with the effectiveness of a self-instructional program in the teaching of handwriting. The remaining null hypotheses dealt with a comparison of the effectiveness of programmed instruction and conventional classroom instruction in the teaching of handwriting.

H_o1. There will be no significant difference between pre- and posttest scores on an objective achievement test in handwriting instruction obtained by subjects receiving programmed instructional units in the teaching of handwriting.

H_o2. There will be no significant difference between pre- and posttest ratings of model manuscript handwriting samples obtained from subjects receiving programmed instructional units in the teaching of handwriting.

H_o3. There will be no significant difference between pre- and posttest ratings of model cursive handwriting samples obtained from subjects receiving programmed instructional units in the teaching of handwriting.

H_o4. There will be no significant difference between posttest scores on an objective achievement test in handwriting instruction obtained by subjects receiving programmed instruction and subjects receiving conventional classroom instruction in the teaching of handwriting.

H_o5. There will be no significant difference between posttest ratings of model manuscript handwriting samples obtained by subjects receiving programmed instruction and subjects receiving conventional classroom instruction in the teaching of handwriting.

H_o6. There will be no significant difference between posttest ratings of model cursive handwriting samples obtained by subjects receiving programmed instruction and subjects receiving conventional classroom instruction in the teaching of handwriting.

Limitations of the Study

As in any study, there are certain conditions which exist or are imposed and therefore limit the scope of the investigation. For example, there does not exist a single standardized instrument which tests skill in providing handwriting instruction. Therefore the achievement test used in this study was specially constructed. Despite the care taken in its development, the instrument was new and previously untested and must therefore be seen as a possible limitation.

A search of the literature failed to reveal any specific criteria for selecting judges of handwriting. It was therefore assumed that teachers experienced in handwriting instruction at a variety of elementary grade levels would possess the necessary competencies. Judges were selected in terms of successful teaching experience for a minimum of five years at the primary and/or intermediate elementary grade levels.

The auto-instructional materials developed for this study were validated in terms of a defined population. Since the effectiveness of any learning program is dependent at least in part on its utilization with those learners who match the assumptions about learners upon which it has been prepared, this in itself need not be considered a restriction. The student population in this study was selected from two institutions of teacher education in order that the learning situation could be more carefully controlled. However, the characteristics of the subjects are considered to be generally typical of those students for whom the programmed materials are intended. Moreover, these characteristics are stated explicitly for comparison.

These limitations would tend to indicate that any generalizations to be made from the findings of this investigation should take these factors into account.

Objectives of the Programmed Units

The auto-instructional materials used in this study were developed in terms of the following behavioral objectives:

Upon completion of the programmed units, the learner will

1. Produce model letters of the manuscript and cursive alphabets using proper letter shape, size, slant, spacing, and sentence alignment.

2. Provide appropriate instructional sequences in handwriting to elementary school children based on individual handwriting needs.
3. Present the manuscript and cursive alphabets to elementary school children in terms of similarity of letter form and stroke, utilizing meaningful vocabulary as well as functional writing situations.
4. Prepare objectives for handwriting instruction which are behavioral, measurable, and observable and which contain the criteria for acceptable performance.
5. Select appropriate methods, activities, and materials to implement instructional sequences.
6. Diagnose difficulties in both manuscript and cursive writing and provide appropriate remedial measures.

Chapter II

Review of the Literature

An extensive review of the literature reveals the dearth of investigations into either the teaching of handwriting or the development and implementation of programmed instruction at the teacher education level. While considerable recent attention has been given to the application of programmed instruction to job training and professional education, the preponderance of this attention has been in the areas of military and industrial training, and education in the health sciences and engineering (Ofiesh and Meierhenry, 1964). Reported research in the area of handwriting, while minimal, has generally been concerned with the physical aspects of the handwriting skill. Little attention has been given to research into the development of effective instructional sequences or the determination of effective methods and learning experiences in handwriting (Herrick, 1963).

Handwriting Instruction and Teacher Education

The relative importance of handwriting in the school curriculum, and the necessity for inclusion of concentration on handwriting at the preservice teacher education level, is debated in the literature. In discussing the role of handwriting in the 1930's, Freeman (1941) pointed out that the sale of handwriting materials during this period had increased at about the same rate as the increase in the sale of typewriters. More recently, Templin (1959) studied the personal writing behavior of 454 adults. She concluded that the typewriter has not replaced the pencil or pen, and that handwriting legibility is still paramount to efficiency in the business and social world. Tannenbaum (1963), on the other hand, has questioned whether or not handwriting actually is a basic skill and whether it should be the focus for detailed research. An analysis of his position, however, suggests that his basic concern is with the possibility that teachers may become overly involved with the esthetics of handwriting to the exclusion of the emphasis on the communications act itself. In this regard he is representative of the prevailing point of view of educators today, who emphasize not only the importance of teaching legible handwriting to children but also the necessity for providing prospective teachers with an opportunity to develop proficiency in both manuscript and cursive writing in order that their writing may serve as a model.

While the development of skill in handwriting has occupied the attention of teachers almost from the time the written word was first used, this general concern for handwriting has not been accompanied throughout the years by a comparable research concern. An individual conference on research in handwriting, held at the University of Wisconsin in 1961, was the first conference of its kind in the world up to that time (Herrick, 1963, p. xi). Analysis of the comprehensive bibliography of handwriting and related factors compiled by Herrick (undated), which covered the seventy year period from 1890 to 1960, revealed that over 70% of the 1,754 entries contained material of a non-technical, descriptive nature. The lack of research into the development of effective instructional sequences in handwriting and in handwriting instruction at the teacher education level is particularly apparent. In a critical review of handwriting studies reported from 1940 to 1950, West (1950) indicated that most were descriptive rather than research oriented, and were addressed to inservice rather than preservice teacher education.

The results of a very small number of recent studies of teacher attitudes and subjectivity in handwriting instruction and evaluation also emphasize the necessity for additional research in these aspects of preservice professional preparation.

Rondinella (1962) investigated teacher subjectivity in grading the handwriting of fourth, fifth, and sixth grade children. Her findings indicated that subjectivity did exist among teachers in rating handwriting samples of elementary school children, and that many teachers were insufficiently aware of the major criteria for grading handwriting samples. In addition, she found that teaching experience had little or no effect on subjectivity in grading handwriting. Fieman (1963) investigated the attitudes toward handwriting of prospective teachers, student teachers, and supervising teachers. He reported that the prospective and student teachers had a significantly more favorable attitude toward handwriting than did the supervising teachers. His findings also revealed the existence of a significant correlation between handwriting attitude and ability. According to Noble (1963), handwriting is an unpopular subject with teachers, probably because the teacher's handwriting tends to be inferior to that of the students. Thus it would appear that the improvement of the handwriting of preservice teachers should have a positive effect on their attitudes toward handwriting and handwriting instruction which in turn should affect their competency in teaching handwriting.

A 1958 survey of 125 elementary teachers in a midwestern city revealed that more than 65% of the teachers had received no formal instruction in the teaching of handwriting (King, 1959). According to Noble (1963), his experiences have indicated that peculiarities in the handwriting of a teacher are frequently found in her students' work as well. Petty (1964) has expressed the prevailing concern with the unresolved problem of inadequate preservice teacher preparation in handwriting in his comment that the absence of handwriting programs in many school systems may be the result of the lack of attention given handwriting in teacher education programs.

In a recent paper citing problems with which research workers in handwriting should be concerned, Horn (1962) posed the following questions: (1) What constitutes adequate preparation to teach handwriting? Should teachers be expected to write with acceptable quality? What types of assistance are desirable in this area for preservice teachers? (2) Do negative attitudes toward the teaching of handwriting on the part of teachers influence pupils' attitudes toward handwriting? Would an understanding of the social importance of good handwriting and professional knowledge of how to teach this subject add to teacher interest? and (3) Is the current lack of concern about handwriting and inadequate preparation for providing handwriting instruction adversely affecting handwriting?

While teachers are receiving very little preparation in teaching handwriting, the recent survey by Herrick and Okada (1963) indicates that handwriting instruction is nevertheless included in the curriculum of most elementary schools in the United States. This survey substantiated the findings of a number of less extensive surveys of handwriting instruction made over the last twenty-five years by Polkinghorne (1946), Freeman (1958), Kravitz (1959), and Soltis (1963). In analyzing the results of their survey, Herrick and Okada (1963, p. 31) have pointed out that, although the teachers reported a curious mixture of instructional sequences in the development of handwriting skill, amost no research has been addressed to this problem of instructional continuities.

When little attention is given to a subject area at the preservice level, and when research evidence is meagre, misconceptions concerning the most effective selection of content and methods may result in dogmatic conclusions which have little basis in fact. Groff (1960) asked 61 directors of elementary education why their school districts had changed from manuscript to cursive writing. He reported that 41% responded that this was better preparation for an adult occupation; 91% believed cursive handwriting to be traditionally the accepted form; and 62% saw the cursive style as demanded by society. Groff (1964) later sent a questionnaire to the personnel directors of 115 large corporations regarding the corporation's preference for the two styles of handwriting. His findings indicated that only 14% of the respondents believed that cursive better satisfied the needs of their employees; that more than twice as many respondents believed manuscript better fitted the needs of their employees than did cursive; and that more than half of the respondents believed that either manuscript or cursive would be adequate for their needs. The evidence of these two studies gives little support to the generally accepted and untested notion that training in cursive writing is better preparation for adult occupations than is training in manuscript, and that employers are likely to demand that their employees use cursive style.

Templin (1959) also noted in her study that the utilization of manuscript writing was common among male respondents irrespective of their early training, and that the majority of male respondents, once exposed to manuscript, made continued use of it all their adult lives. She concluded that manuscript holds certain business and professional advantages for sales. While these advantages were not determined from the date gathered in her study, her findings substantiate the results of Groff's surveys.

Programmed Instruction and Teacher Education

The literature describing developmental activities and research on auto- instructional techniques dates back to the mid-1920's following the production of Pressey's first teaching machine (Pressey, 1926). Lumsdaine (1963), in an extensive review of the research in instruments and media of instruction, has suggested that auto-instructional methods may represent the most important innovation in education since the advent of the textbook. His rationale for this opinion lies in the fact that programmed instructional material is closely tied to the use of empirical data obtained from the responses of students during the continuous process of field testing.

Programmed Instruction at the College Level. Convincing evidence that programmed instruction is effective for teaching has been accumulated over the past decade as a result of extensive research involving a variety of subject areas and extending from the primary grades through adult education. Results of experimentation with programmed learning at the college level have almost invariably indicated that it is not only effective but also economical as an instructional medium.

Holland (1959) as well as Coulson and Silberman (1960) have reported success in teaching certain aspects of behavioral psychology to college students using programmed materials. Holland (1962) also reported highly favorable voluntary comments from participating students.

The economy of programmed instruction has been described by Ferster and Sapon (1960), who indicated that college students who completed a programmed course in German learned in 47.5 hours an amount of German comparable to that presented in 145 hours of combined class time and outside preparation. A combined programming and audio-visual approach to teaching college students how to use the library was found to be effective not only in producing learning but also in the transfer of this learning to the real life situation (Wendt & Rust, 1963). In addition, there are apparently fringe benefits in the form of positive motivational effects. Blyth (1960) reported these advantages in teaching logic with programmed instruction: (1) no time was wasted on routine checking and drill; (2) since students had acquired a working command of basic concepts and principles through the program, class time could be devoted to the application of these concepts to new ideas; and (3) there was a great increase in interest and improvement of morale.

Considerable investigation is currently under way with college students to determine which variables in programmed instruction best foster and facilitate learning. Holland and Porter (1961) investigated the effect of spaced review in programmed instruction in a study involving graduate students in an educational psychology course. At all levels of difficulty, the non-review group (those who did not repeat missed items) missed more items than the review group. Postman and

Senders (1964) examined with undergraduate students explicit and covert set to learn. They found that learning outside of explicit instruction is not haphazard but varies systematically with the instructions, and concluded that learning is dependent on both explicit and covert set.

Krumboltz and Weisman (1962) investigated the effect of intermittent reinforcement in programmed instruction on undergraduate students in an educational psychology course. They found that groups receiving fewer confirmations made more errors during learning but that there were no differences among groups on criterion tests. Melaragno (1964) studied the effect on freshman mathematics students of some negative reinforcement within a sequence of instructional items which were positively reinforcing. He found that, as in the case of Krumboltz and Weisman's results with intermittent reinforcement, groups receiving all positive and spaced negative reinforcement did not differ significantly on criterion tests. He did find, however, that massed negative reinforcement sequences tended to depress learning.

The results of studies such as these have important implications for teaching and learning at all educational levels, and especially in teacher education.

Programmed Instruction in Professional Education. Interest in programmed instruction as a medium for providing not only undergraduate and graduate education but also continuing self-instruction upon completion of formal education has been growing in a number of professional fields. The applicability of programmed instruction to medical education, for example, has been explored in a number of recent studies whose results indicate its effectiveness in providing professional education. Lysaught

(1965) has further reported highly positive reactions of both medical practitioners and medical educators to programmed instruction. Nevertheless, while research by and for educators has resulted in the development and continuous improvement of an obviously effective instructional medium, the one area in which its potential contributions have been largely ignored is that of teacher education (Plattor, 1965).

A recent survey of programmed instruction in teacher education, conducted by the Subcommittee on Instructional Media and Teacher Education of the American Association of Colleges for Teacher Education (1963) and confined to member institutions, revealed that only one-quarter of the respondents had taught or were teaching courses about programmed instruction and one-third had taught or were teaching program writing as part of a course not primarily concerned with programmed instruction. In both cases, these courses were largely confined to graduate students. One-third of the respondents indicated that they had written programs relevant to teacher education. However, most of these programs were still under development at the time of the survey.

Three-quarters of the respondents reported that they had used published or locally produced programs as part of course assignments. The typical students involved were in a teacher education curriculum. It is interesting to note, however, that the most extensive bibliography of programs and presentation devices currently available, which lists programs in 28 general and 72 specific subject areas, neither includes a classification in teacher education nor lists any programs in the area of teacher education (Hendershot, 1964). A report by Varty (1964) of very recent research designed to locate and make available data relative to adult programs of self-instruction does not list any programs in the area of teacher education. It is therefore reasonable to assume that respondents reporting the use of programs in teacher education curricula are not using these programs in professional education courses, but rather in those academic courses which are typically included in programs of teacher education.

In one of the few reported studies of programmed instruction in teacher education, Rough (1962) used a programmed learning sequence on The Contemporary Secondary School with one group of students, while a matched group received the same material in lecture-discussion class meetings. The results indicated that the group receiving the programmed instruction learned as effectively as the group receiving conventional instruction. A project in which a programmed course in audio-visual materials was used with preservice teachers just prior to student teaching has been described by Garrison (1964). While no statistical evaluation was made of the project, he reported that the students reacted enthusiastically to the program.

Archer and Sanzotta (1964) have reported the results of a survey designed to determine the administrative and instructional adjustments that appear to contribute to the effective use of programmed learning materials. They found that approximately two-thirds of the teachers surveyed had been using programmed instruction for regular instruction and one-fourth of the teachers had been using programmed instruction for enrichment. Of those surveyed, 97% of the administrators and 85% of the teachers recommended continued use of programmed instruction. They concluded, however, that the programs were not being used most effectively by the teachers, and that inservice programs prior to the introduction into a school of self-instructional materials were essential for the successful use of such materials.

Lysaught (1961) has suggested that no professional educator would willingly adopt materials without sufficient knowledge and experience with them to use them effectively and comfortably, and that this level of knowledge and experience could best be achieved by the actual development of a programmed instructional unit. This conception of the role of the teacher in programmed instruction led to the development at the University of Rochester of the first course in programming instructional materials for classroom teachers and industrial trainers (Lysaught & Williams, 1962). Since that time, a number of similar courses have been developed and are currently provided for graduate students in education. The provision of these kinds of experiences at the preservice teacher education level, however, remains largely unexplored.

Theoretical Framework

Gage (1963, p. 97) has defined teaching as any interpersonal influence aimed at changing the ways in which people behave, and has suggested that the behavior producing the influence may be "frozen" in the form of a program for use in programmed instruction. He has defined research in teaching as research in which at least one variable consists of a behavior or characteristic of the teacher(s) and has suggested that the teacher may be the author of a program--someone who is not seen by the learner (Gage, 1963, p. 97). The investigation described in this report, which deals with relationships between the learners and their attainment of educational objectives as these are affected by a learning program, may be defined as research in teaching within this context.

Smith (1960, p. 223) in a further refinement of the definition of teaching, has conceived of teaching as a system of actions directed toward pupils. From the execution of these actions and interactions of teachers and pupils, learning occurs. If a learning program is defined as a sequence of actions which assures interaction of teacher (program) and pupils, then, by Smith's definition, learning occurs.

In turms of research design, this investigation was concerned with whether or not the variable of programmed instruction could produce in the learner hypothesized operational behaviors. The following model, based on a pedagogical paradigm developed by Smith (1960, p. 223), may prove useful in explicating this concept.

Independent Variables		Intervening Variable		Dependent Variables
(Learners)	→	(Program)	→	(Learners)
Pre-instructional performance behavior in handwriting.		Characteristics of programming.		Post-instructional performance behavior in terms of behavioral objectives.
Pre-instructional knowledge and understanding of handwriting pedagogy.		Program construction based on the programming cycle.		Post-instructional knowledge and understanding of handwriting pedagogy in terms of behavioral objectives.

By referring to the model, it can be seen that the actions of the learner and the program are related in certain ways. Defined behavioral characteristics of the learner (independent variables) influence the programming cycle in the construction of the program which itself has certain defined characteristics (intervening variable). As a result of the programming process, the learner behaves in terms of observable and measurable behavioral objectives (dependent variables).

Chapter III

Development of the Program

The function of programmed instruction is the implementation, within a given learning situation, of subject matter based upon the principles of learning theory, educational methodology, and individual technology most appropriate to providing effective and efficient learning sequences. The instructional medium involved in the implementation is the program itself. The success of this instructional medium is dependent not only on the effective selection, organization and sequencing of the program's content, but also upon the extent to which the responses of learners typical of those for whom the program was designed consistently influence and shape its development and modification.

Procedures for constructing and evaluating programmed instructional sequences have received considerable attention during the past several years. The programmed materials utilized in this study were developed in accordance with the process of program construction proposed by Lysaught and Williams (1963). The principles and procedures involved in this process include and extend those developed by such programmers as Skinner (1958), Holland (1962), Klaus (1964), Keisler (1960), and Cook and Mechner (1962).

Lysaught and Williams' approach to program construction involves the following activities undertaken in the order in which they are listed: (1) selection of subject matter--in this case those factors involved in the production of legible and fluent handwriting as well as in the development of competence in teaching handwriting; (2)

description of the learner--in terms of those characteristics, in this case, which are pertinent to the development of handwriting skills and instructional competencies; (3) preparation of objectives--the specification of those handwriting and instructional behaviors which the learner should be able to demonstrate when he has completed the learning sequences;' (4) selection of a programming paradigm or model which provides the basic conceptual framework through which individual items are connected--in this case the linear model; (5) organization and sequencing of items in the program; (6) construction of the items; (7) initial field testing with a limited number of subjects representative of the learners for whom the program was designed; (8) evaluation through the administration of a device or devices designed to elicit information concerning the effectiveness of the program as well as the formation of judgements based on an analysis of the data; and (9) revision of the program where appropriate in terms of the findings.

Since most handwriting instruction is provided by teachers at the elementary grade level, it is interesting to note the parallel between Lysaught and Williams' approach to the development of instructional sequences and that of certain writers concerned with curriculum planning at the elementary level. Sowards and Scobey (1961), for example, have emphasized that the usefulness of objectives--that is, the degree to which objectives can be readily translated into educational programs--is determined by the extent to which they are stated in behavioral terms. In a discussion of the influence of programmed instruction upon curriculum planning, McNeil (1963) has suggested that a comparison of conventional curriculum inquiry with examples of programming activity reveals the following similar central tasks: (1) ascertainment of instructional objectives; (2) statement and measurement of objectives; (3) selection and organizational procedures.

Selection of Subject Matter

The first step in the development of the programmed instructional units upon which this investigation was based, then, was the selection of the subject matter to be programmed. Since this study was concerned with the effect of programmed instruction on the ability of preservice teachers to provide handwriting instruction as well as their ability to provide models of manuscript and cursive writing, the subject matter necessarily included those factors involved in the production of legible and fluent handwriting in both manuscript and cursive styles as well as those aspects of instruction appropriate to the development of learning sequences in handwriting for elementary school children.

Reference to the provision of handwriting instructional sequences as well as to the production of legible and fluent handwriting may be found in articles and chapters in professional texts and journals, curriculum guides in the language arts and handwriting, and teacher's manuals included with commercial handwriting programs. While a large number of professional texts are devoted to the language arts area of reading, and a relatively smaller but still substantial number are concerned with oral expression, creative writing, grammar and spelling, very few professional texts are devoted solely to the teaching of handwriting. Those few which are available generally provide an overview of the research in handwriting and its implications for instruction, or present basic principles and specific teaching procedurs. Chapters in professional language arts texts which deal with handwriting are generally broad in scope and place little emphasis on effective teaching procedures.

Articles in professional journals, on the other hand, provide a relatively broad coverage of current thinking concerning factors in the production of legible and fluent handwriting and the provision of instructional sequences. These articles often review the research, provide applications of the research to handwriting instruction, and provide suggestions for instruction using a variety of philosophical approaches, methods, and activities.

The one factor which has the greatest influence on the handwriting instructional program in any school is the commercial handwriting system being used in that school. A 1946 study by Polkinghorne (1946) indicated that about 65% of 168 respondents were using a commercial handwriting program. Eight such programs were mentioned by these respondents. More than 80% of the schools reporting in the recent study by Herrick and Okada (1963) indicated that they used a commercial system of instruction as the basis for their handwriting program. Only four per cent reported that they had developed their own systems, and of these, most furnished children and teachers with supplementary materials from some commercial sources.

A recent study by Herrick (1960) compared instructional practices in handwriting advocated by 19 commercial handwriting systems.

Of these 19 commercial systems, which account for 97% of the use of such materials, all except two provide a teacher's manual (Herrick, 1963, p. 27). Many different forms of the same symbol in both manuscript and cursive letters and numerals are taught by these handwriting systems. These letter and number forms were analyzed, and model manuscript and cursive alphabets were developed for use with the program which contained the forms most generally agreed upon by the commercial systems. (See Appendix A.)

In size, these teacher's manuals vary from a few pages at the beginning of a workbook to complete texts. In some cases there is one manual for the entire series, while in others there are manuals for each instructional level.

The manuals vary as much in content as in size. No one item is included in all guides, although most contain a description of a series and a justification of the method or statement of the underlying philosophy of the system. In general, it appears that the commercial systems consider the primary purpose of these manuals to be that of explaining the series to the teacher, with help in lesson planning as a secondary function (Herrick, 1960).

In selecting the subject matter for the programmed units, the instructional practices suggested in these manuals were considered in terms of available methodological research. Where the evidence was supportive, the practice was included as part of the subject matter of the program. Where support was lacking, or conflicting evidence was discovered, the practice was modified or rejected. According to most teacher's manuals, for example, the only effective paper position for the left-handed child is the placement of the paper at an opposite slant to that generally used by the right-handed child. Recent research by Enstrom (1962b), however, clearly indicates that this is only one of three positions used by left-handed writers which yield desirable results in terms of writing quality and speed. All three of these positions were therefore presented and illustrated in the program. Where no research evidence concerning the practice was available, those factors were included which most respondents to surveys had indicated were successful in handwriting instruction.

Description of the Learner

Goldstein (1964, pp. 220-221) has suggested that, just as Caesar described all Gaul as divided into three parts, so programmed instruction may also be thought of as a "tripartite entity." One major division is the program itself; the second is the method used to administer the program; the trinity is completed by the learner to whom the program is presented. Goldstein has further suggested that the most complex of these three divisions is that of the learner. A multitude of factors, such as age, sex, mental ability, educational level, motivational level, reading ability, attitude toward learning in general and programmed instruction in particular, contribute to the effectiveness of a given program.

Lysaught and Williams (1963) have listed three characteristics of the learner which require specific attention in the preparation of programmed learning sequences. These are: (1) current level of ability, including such factors as intelligence, achievement and reading ability; (2) background factors, including age, sex, socio-economic status and urban-rural considerations; and (3) purpose, or the motivation which impels them to learn.

The programmed instructional units used in this investigation were developed in accordance with the following descriptions of the learners:

1. The learners' ability and undergraduate record are such that they are currently enrolled in a program of teacher education at the elementary grade level.
2. The learners' purpose is to teach at that level.
3. The learners have had no formal instruction in the teaching of handwriting.

Preparation of Objectives

The current concern with the reexamination and redefinition of the role of the teacher has led to the rapidly growing conception of the teacher as a decision maker as well as the developing notion that programs of teacher education must be designed to provide teachers with skill in decision making. Once a teacher decides that he will teach his students something, he must decide upon the goals he intends those students to reach at the conclusion of the learning experience. Since the major objective of any instructional program is to alter the learner's response to his environment, or change his behavior, the objectives must be stated in such a way that they communicate this proposed behavioral change--that is, that they describe the pattern of behavior which the learner will be able to demonstrate when he has completed the instructional program.

According to Short (1964, p. 162), acceptance of the concept that educational objectives should be stated in terms of stimulus conditions that can be replicated and observable responses that have a high probability of occurring in the presence of these stimuli is so widespread that it has joined the select company of "motherhood" and "country." Like the weather, however, this appears to be a concept that everyone believes in, but no one does anything about. Mager (1962) has suggested that the probable reason objectives are not generally stated in behavioral terms is that few teachers know how to prepare objectives which include criteria for evaluation and specify terminal behaviors. He therefore characterized instructional objectives in the following terms: (1) an instructional objective is a statement that describes an intended outcome of instruction; (2) an objective is meaningful to the extent it communicates an instructional intent to the reader and does so to the degree that it describes the terminal behavior expected of the learner; and (3) terminal behavior is defined by identifying and naming the observable act which will be accepted as evidence that the learner has achieved the objective, and by describing the conditions necessary to exclude acts that will not be accepted as evidence that the learner has achieved the objectives.

An analysis of the objectives presented in discussions of handwriting instruction in professional texts, journals, curriculum guides and teacher's manuals indicates that most of these objectives are not stated in behavioral terms. Typical of these objectives are: to stimulate keen interest among children in learning to write

(Gray, 1956, p. 211); to foster a desire to write well at all times and a willingness to strive for self-improvement (Cincinnati Public Schools, 1960, p. 93); to develop an understanding of the value of purposeful, systematic practice (Webster Central School, 1963, p. 2); to develop an appreciation of the relationship between correct, legible writing and correct body adjustment (Townsend, 1956, p. 6).

While all of these are admirable goals, none of them indicates what the learner will be doing when he demonstrates that he has achieved these goals. The use of such words as "foster a desire," "develop an understanding," and "develop an appreciation," are not explicit enough to prevent misunderstandings or lack of agreement as to the kinds of behaviors which demonstrate that the learner can do these things, or the kinds of learning experiences which lead to these behaviors.

The programmed instructional units used in this study were developed and test data were analyzed in terms of the behavioral objectives listed in Chapter I. These units were not only constructed in terms of these specific behavioral objectives, but part of the program itself was devoted to teaching the learners how to prepare operational objectives for handwriting instruction in order to allow the selection of appropriate learning and evaluative experiences for children. Objectives presented in principal sources of suggested instructional sequences in handwriting, as well as activities and evaluative devices suggested to implement and appraise these objectives were reviewed. Statements of behavioral objectives to be achieved at six instructional levels from writing readiness to the equivalent of fifth grade were prepared by the investigator in the form of an exhibit to be used with the set devoted to the preparation of these objectives. A list of general objectives, or statements which were not behavioral in nature, was also included as part of this exhibit. These general and behavioral objectives are presented in Appendix B.

Selection of a Paradigm

The paradigm selected by the programmer supplies the basic conceptual framework through which the individual items in a programmed instructional sequence are connected. Lysaught and Williams (1963) have emphasized the importance of choosing the paradigm in terms of the subject matter to be programmed, the assumptions about the learners, and the objectives.

While a number of programming paradigms may be found in the literature, most of these are variations of two basic models: the straight line or linear program developed by Skinner and his associates, and the branching program developed by Crowder (Green, 1962, p. 140). A linear program is composed of small steps leading logically through the subject matter from topic to topic. In this type of program it is important that the learner make as few errors as possible; therefore the increments in information which the learner is expected to absorb are small. Through immediate feedback and reinforcement, the probability of a correct response to the elements within the frame is increased. Typically, the learner constructs his responses to the items--that is, he is required to formulate and write his own response to the stimulus. A basic assumption of the linear program is that the learner's construction of the response is an integral part of the learning situation. An additional assumption is that responses made overtly--by constructing them in writing--more effectively assure the occurrences of learning (Lysaught and Williams, 1963, p. 72).

In a branching program, the student is presented with a problem and several alternative responses, one of which is correct. When the student selects a response, he is instructed to move to another frame, which provides feedback as to the correctness of his response. If the response was incorrect, the learner is provided with information as to why it was incorrect, and is either returned to the original item or directed to a subprogram. Ultimately, however, the learner must respond correctly to the item. Rather than a constructed response task, the learner is faced with a recognition task, with the range of possible responses mechanically limited. A basic assumption in the branching program is that the shaping of behavior requires the selection of alternatives rather than the construction of responses. In a comparison of the behavior required in the linear and branching programs, Green (1962, p. 147) has pointed out that if a student has learned a set of material to the degree that he is capable of constructing an appropriate response, he has certainly learned it well enough to recognize it, but that the reverse may not be true. This is an important consideration in instruction.

The decision of the investigator to adopt a linear model in constructing the programmed units used in this study was influenced by several basic considerations. Since this research was concerned in part with the effect of programmed instruction on the learner's ability to write in manuscript and cursive styles, it was essential that the programming paradigm allow the learner to construct his responses--to actually write in manuscript and cursive styles--in order that correctly written responses might be reinforced. The checking of an alternative in a branching program would not provide this experience. Both the teaching of handwriting and the actual acts of writing in two different styles involve an ascending order of complex skills which must be closely interrelated. The linear program, consisting as it does of small steps which contain intercept elements and which lead logically through the subject matter from the simple to the complex, lends itself more effectively to training in the complex motor skill of handwriting than does the branching program.

Wallen and Travers (1963, pp. 452-3) have pointed out that a teacher tends to teach as he was taught, and that most teachers today teach in accordance with the pattern they observed when they were pupils and which they believe is expected of them. They have further indicated that teachers today tend to control the classroom in the way that has typically been expected of them, and which has generally been authoritarian in nature. If teachers are to be prepared to help children learn by discovery, it would appear that they themselves must be provided with opportunities to learn by discovery. A branching program and traditional teaching techniques alike require mainly that the child recognize materiel rather than construct his responses to that material. The linear program, hwoever, should provide experiences with the discovery method of teaching and learning which the teacher should be able to transfer from the program to the actual teaching situation.

The learners' entering knowledges and skills in handwriting instruction were assumed to be very similar at the start of the instructional sequence. Therefore, little adaptive work was expected to be necessary, and a branching program was considered unnecessary. Since the learners were assumed to be unfamiliar with the programming process and with programmed materials, a paradigm which did not call for involved directions appeared essential. The format of a programmed linear textbook seemed most appropriate in meeting all of these considerations.

Ordering and Sequencing of Items

The ordering and sequencing of the elements of an instructional program prior to the actual construction of the items or frames clearly affect the probability of correct responses and are thus essential to reinforcement and feedback. A number of techniques for ordering or sequencing items are suggested in the literature. These include: (1) the Pragmatic approach (Lysaught & Williams, 1963, p. 93), in which the objectives of a program are aligned into a logical order and become a sequential guide to be followed in the construction of the items; (2) the Ruleg system (Evans, Glaser, and Homme, 1960), in which the assumption is made that material to be presented in a program consists of either rules (RUL) or examples (EG), and in which those rules and examples related to the desired behavioral objectives are organized into a logical sequence; and (3) Mathetics (Gilbert, 1961), in which a specific series of organizational steps is provided which includes a prescription of those behaviors constituting mastery in a subject area, a description of the generalizations to be taught, and a program design consistent with the description of the generalizations.

Lysaught and Williams (1963, pp. 97, 101) have suggested that many programmers use an _ad hoc_ approach which reflects a concentration on the subject matter, a definition of the terminal behaviors, and the pragmatic arrangement of a sequence of steps designed to move the learners from the initial to this terminal behavior. Klaus (1964) has recommended that, once the objectives have been identified, the next step is the careful preparation of a course outline covering the material the programmer wishes to teach. This outline is derived from textbooks, reference sources, and the comments of teachers familiar with the subject area.

The Pragmatic approach was employed in the ordering and sequencing of the items included in the programmed units in the teaching of handwriting. As Klaus suggested, analysis of material concerned with the handwriting act or instruction in handwriting was followed by the development of a course outline covering the material to be taught in the program. This outline served as a very useful guide as the program developed; however, as the construction of the items proceeded, a number of modifications in the outline were found to be necessary as new information became available.

The initial outline of the program, presented in Appendix C, consisted of six units:

1. Introduction to the Program.
2. General Considerations in Teaching Handwriting.

3. The Manuscript Alphabet.
4. The Cursive Alphabet in the Transition to Cursive Writing.
5. Diagnosing Difficulties and Providing Remediation.
6. The Left-Handed Child.

The first major revision reduced the number of units to the following four:

1. Handwriting and Communication.
2. Our Alphabet Systems.
3. The Development of Instructional Sequences in Manuscript and Cursive Handwriting.
4. Diagnosis and Remediation in Handwriting.

A Preface, consisting generally of the material originally in the first unit of the program, was also added.(See Appendix D.)

As a result of preliminary field testing of the revised items in the first, second, and third units, a second alteration in the outline was made. The content of the first two units was considerably decreased and combined into one unit. Separate units concerned with the elements of legibility in both manuscript and cursive writing styles were added. The unit on diagnosis and remediation was eliminated, with content in these areas included in the sets concerned with the selection of methods, activities and materials in handwriting.

The original outline tended to reflect the general organizational pattern of presentation of material in handwriting instruction found in principal resources in this area. As the examination of the literature in both handwriting instruction and programmed instruction continued, it became clear that certain approaches to the development of programmed instructional sequences were quite similar to approaches to curriculum development proposed by writers in the field of curriculum at the elementary grade level. If teachers tend to teach as they were taught (Wallen & Travers, 1963), it was reasonable to assume that organization of programmed units in handwriting instruction which demonstrated the programming technique might provide teachers with an instructional approach which would be transferred to the elementary school classroom.

The unit concerned with the development of instructional sequences in handwriting was therefore organized into eight sets with the following titles:

1. Description of the Learner.
2. Preparation of Objectives.
3. Selection of Methods, Activities and Materials--Readiness for Initial Instruction in Handwriting.
4. Selection of Methods, Activities and Materials--Position and Movement in Handwriting.
5. Selection of Methods, Activities and Materials--Manuscript Writing.
6. Selection of Methods, Activities and Materials--Cursive Writing.
7. Evaluation of Instruction.
8. Conclusions (review items based on the entire program).

These sets reflected the approach to programming followed in the development of the programmed units used in this study, as well as the approaches to curriculum development at the elementary grade level which most closely paralleled this programming approach. This final revision of the outline is presented in Appendix E.

Construction of the Items

Programmers are generally agreed that the most difficult step in the programming procedure is the actual writing of the items (Green, 1963, pp. 150-151; Klaus, 1964, p. 41; Lysaught & Williams, 1963, p. 102). The problems encountered in item construction have led to the formulation by programmers of a number of rules and suggestions for writing program items.

Klaus (1964, pp. 43-49) has listed twelve such rules which include: (1) requiring overt responding; (2) insuring correct responses through proper cueing; and (3) providing for frequent repetition of relevant responses. Margulies (1964) has drawn a distinction between what he calls "critical response frames" and "everything frames." In the critical response situation, the student is assumed to know only the material to which he has responded correctly. A student working with an "everything frame" is held responsible for every item of information in the frame, even if such information is irrelevant to the program objectives. According to Margulies, responses in a critical program are an integral part of learning, but in an everything-is-learned program, they are not. The programmed units in handwriting instruction employed critical response procedures. While considerable additional material was presented to enrich items and maintain interest, the learner was held responsible only for relevant response material. Inadvertant copy frames were avoided through proper attention to cueing.

The role and function of cueing is emphasized in the literature. Green (1962, pp. 152-153) has stressed the importance of language in cueing in his comment that a chain of words in a phrase or sentence determines to a great degree the next word to follow. An interesting example of this was found in the following item, written early in the development of the handwriting program.

The major advantages of writing for the child, then, are its ___________, ___________, its capacity for revision or ___________, and the opportunity it affords the child for self- ____________________.

During initial field testing, one subject became quite confused with this item. She pointed out that the responses presented no problem since they were known to her. However, because the responses required a change in word form from that being used in previous items, she was uncertain as to how to proceed. The words "precise" and "permanent" had been the responses to prior items; in this item, however, the required responses were "precision" and "permanence." The subject suggested a change in the sentence structure which would permit using the word forms taught in prior items. The following item revision apparently solved the problem, since no errors were made in the item in its revised form.

The major advantages of writing for the child, then, are:

1. Writing is more ________________.
2. Writing is more ________________.
3. Writing can be revised or ______________.
4. Writing gives the child an opportunity for self- ________________________.

Steps are simplified when ample prompting fosters the correctness of a response. Therefore care must be taken to insure that over-prompting does not occur. However, the physical length of a frame may contribute to prompting by reducing interference from other material which would serve as a distracting element in a longer instructional sequence. Lumsdaine (1961, p. 474) has pointed out that this is particularly evident in the case of procedural learning by imitation—as in learning to write the alphabet from a model—where the use of a short demonstrational step provides a direct, easy prompt for the imitation of that step. In two studies reported by Maccoby and Sheffield (1961), the use of such small steps led to generally superior performance in practice, and in some cases to superior later performance under unprompted test conditions. Demonstration items concerned with letter formation were therefore kept short, with very small increments of information presented in each step. An example of this may be found in the following items:

Write the letter b in manuscript. ______

Write the letter b in cursive. ________

When did you lift your writing instrument in writing each letter?

____

Another basic difference, then, involves word and letter JOINING. The strokes which make up a word are ____________ in cursive writing. This requires the addition of ___________ strokes in cursive writing which are not necessary in manuscript.

The teaching of handwriting involves what Sheffield (1961, p. 13) describes as a common training problem: the teaching of complex sequences of responses which must be learned in a fixed serial order. He has suggested that in such training situations, both demonstration and practice can be used. He has further pointed out that demonstration is always necessary in order to show the learner what must be practiced, and that, while practice is not always necessary along with demonstrations, it is well established that some form of overt practice adds considerably to the effectiveness of the training procedures.

Throughout the units concerned with the development and improvement of the teacher's skill in presenting handwriting models to children, both demonstration and practice provisions were made in the same frame.

STRAIGHT-LINE strokes may be:

VERTICAL |

HORIZONTAL —

DIAGONAL \ /

Write a:

VERTICAL line stroke ____________

HORIZONTAL line stroke ____________

DIAGONAL line stroke ____________

Write a lower case letter with a:

VERTICAL line stroke ____________

HORIZONTAL line stroke ____________

DIAGONAL line stroke ____________

In order to heighten interest and provide the most effective feedback, the desired responses (correct letter forms) for a number of practice items were placed on a separate page which was attached with a staple to the page on which the item had been printed. A carbon sheet was inserted between the item and response pages. The learner was directed to write her response, remove the staple and carbon sheet, and compare her response with the model. Practice and demonstration were thus combined through the use of this response technique. In addition, immediate reinforcement of correct letter forms was provided. Where letters were not formed correctly, comparison with the model provided an immediate opportunity for correction. Student comment concerning this technique was extremely positive. A sample item with attached carbon may be found in Appendix F.

A number of cueing or prompting devices were used in the construction of the items, including formal prompts[1], thematic prompts[2], and vanishing or fading[3]. Formal prompts were provided through the use of such devices as underlining, capitalizing, various styles of type (print, cursive, italic) and the provision of the first letter in a response word. The following are examples of items which utilized formal prompts:

> Notice that the cursive chancery style was only slightly SLANTED and that many of the letters were not JOINED.
>
> Notice that today's cursive writing is both ______________ and ______________.

> The child's writing should be related to his immediate activities and should have meaning or PURPOSE. When we teach handwriting through involving the child in writing meaningful words and useful materials from the beginning, we are using the functional or p ____________________ approach to handwriting instruction.

A major thematic prompt used in the program was the mnemonic device. Several mnemonics were employed. One was concerned with the elements of legibility--those factors essential to the production of legible and fluent handwriting. The following item illustrates this mnemonic:

> The ZIP CODE for these elements of legibility is *A 4 S*. There are FIVE essential elements of legibility. According to our ZIP CODE, one of these ______________ of ____________________ begins with the letter __A__, while four begin with the letter __________.

Another mnemonic was concerned with the five steps essential to an effective lesson in handwriting. This mnemonic was taught in a series of nine items which also illustrate the use of fading in the construction of items. These items are presented in Appendix G.

The provision of supplementary devices to be used in conjunction with the program constitute another type of prompt, since such devices and materials increase the probability that a particular response will be emitted. These devices, generally called *exhibits* or *panels*, contain reference materials organized in conjunction with the program but handled separately by the learner.

A total of 21 exhibits were developed for use with the programmed units in handwriting instruction. Of these, nine involved the model manuscript and cursive alphabets in various letter groups, while the others included handwriting scales, vocabulary lists, paper samples, manipulative materials and lists of objectives. These exhibits served

2

a variety of purposes, including the provision of both reference and practice materials.

The tutorial nature of a learning program has been emphasized in the literature (Skinner, 1961; Ofiesh, 1964). The tutoring relationship presupposes an atmosphere of continuous interaction between the tutor and the student. This relationship further presupposes some discussion between the tutor and the student prior to the student's arriving at a desired response. Therefore items specifically designed to be discussive, and, in addition, to provide an opportunity for the learner to be creative, were also constructed. The following is typical of these items:

> Item
>
> The medium of expression may take a number of forms. It may be a sign or a signal: a wave of the hand may send a message of farewell if you are leaving.
>
> But a signal is rarely precise. In another situation, the same wave of the hand may indicate a greeting of welcome! (This is probably what we mean when we say that we don't know whether we're coming or going.)
>
> To prove the point, write in one sentence what the wink of an eye means to you.

Response

The wink of an eye means many things to many people. We can only be sure of one thing--your interpretation of a wink will be different from someone else's interpretation. Obviously, it depends on who winks at you, doesn't it?

Lysaught and Williams (1963) have suggested three kinds of review materials which should be considered in the construction of items. The first is rote or repetitive material which appears in items immediately following the initial development. The second utilizes restatement in a slightly different context as a method of determining the extent to which the learner can use or apply the information he has acquired. The third type of review is delayed repetition, injected into the program to evaluate the retention of information.

All three of these types of review materials were included in the construction of items for the programmed units in handwriting instruction.

Rote or Repetitive Item

An instructional objective in handwriting which is BEHAVIORAL would tell us how the learner is to __________ when he has achieved the objective.

Item Preceding Repetitive Item

Statements of purpose are most useful when they are expressed in terms of human behaviors--when they are BEHAVIORAL. Both the planning and evaluation of instructional sequences are more effective and efficient if statements of purpose or objectives are ______________--that is, if they are expressed in terms of human ______________.

Restatement Item

Look at Exhibit 12C. Look at the first objective at the Readiness Level. What will the learner be doing when he demonstrates that he has achieved this objective?

Delayed Repetition Item

We noted earlier that an objective is most useful when it is stated in terms of the learner's specific __________. When the objective describes what the learner will be ______________ when he demonstrates competency, we say this is a ________________ objective.

Initial Testing

Programmers are virtually unanimous in their agreement that the only appropriate judge of the effectiveness of an item is the student for whom the item is intended. They are equally unanimous in their agreement that empirical data derived from student responses to newly constructed items and item sequences provide an indispensable basis for program revision and improvement (Green, 1962, p. 171; Klaus, 1964, p. 40; Lumsdaine, 1960, p. 137; Lysaught & Williams, 1963, p. 122).

An essential step in the programming process is the presentation of newly constructed items to a trial subject or group of subjects typical of the learners for whom the program is intended who proceeds through the program as a student might eventually do in a classroom. Klaus (1964, p. 40) has pointed out that it is probably at this step that the difference between auto-instructional techniques and what teachers do in classrooms is most pronounced. In programming, it is assumed that the burden of instruction rests with the program rather than with the learner. When the student makes an error, it is assumed to be the fault of the program and not some inability on the part of the trial subject.

The extent to which this difference does exist was clearly demonstrated during initial testing of the handwriting program. A major problem encountered by the investigator was the trial subjects' resistance to the suggestion that incorrect item responses might be the result of an error on the part of the programmer rather than a mistake on the part of the subjects. When the subjects made errors, they invariably apologized for their "stupidity." Once the subjects became convinced that the investigator was not insulted by critical comments, but that, in fact, such comments were essential to the effective revision and modification of the items and item sequences, they displayed considerably more insight into the possible reasons for incorrect responses, and provided a significantly greater number of suggestions for the improvement of the items.

Initial field testing of a sequence of items may take place with only one typical learner or with a sample number of students who fit the assumptions about the learners. The importance of establishing an interactive situation between programmer and trial subjects is emphasized in the literature (Green, 1962, p. 171; Lumsdaine, 1960, p. 137, Lysaught & Williams, 1963, p. 122). Initial field testing of the programmed instructional sequences in the teaching of handwriting took place over a three month period and involved three female students at Auburn University who were considered typical of the learners for whom the program was intended in that they were enrolled in a program of teacher education at the elementary level, were planning to teach at that level, and had had no formal instruction in the teaching of handwriting. As each set of items was completed, it was administered to each of the students on an individual basis. Subjects were directed to record their responses on special answer sheets, and, in the case of errors, to record the correct response next to the incorrect one[4]. Subjects were further requested to check those items which were unclear to them. When the subject completed the set, the investigator and the subject examined each item to which an incorrect response had been made as well as those items checked as ambiguous or confusing. Where lack of clarity within an item caused hesitation or prevented a subject from proceeding, the investigator and subject discussed the item at that point (prior to the completion of the set). While modifications and revisions were generally made after analysis of the responses of all of the subjects, where necessary adjustments were made during the initial testing situation.

A number of item revisions were made on the basis of the trial subjects' responses, comments, and suggestions. Several of the original and revised items are presented here as examples of these modifications.

Original Item

While the spoken word was and still is an effective medium of expression, we sometimes have a way of changing the meaning and intent of a message when it travels by word of mouth. If we are in a face to face verbal situation, we can usually clarify misunderstandings that occur as a result of ineffective speaking and inattentive listening. It is often difficult for oral messages to be repeated exactly as they were spoken unless the words are ________________ in some manner.

Each subject provided a different response to this item. One responded with "changed;" another with "memorized;" and the third subject wrote "expressed." (The desired response was "recorded.") Analysis of the item indicated that insufficient cues had been provided, and the item was too wordy. In addition, the subjects indicated that, when the item became unclear, they had tended to skim rather than read carefully.

Revised Item

The spoken word was and still is an effective medium of expression. However, we sometimes have a habit of changing the meaning of a message when it travels by word of mouth unless it is recorded in some way. It is often difficult for oral messages to be repeated exactly as they were spoken unless the words are ____________________ in some manner.

The addition of a formal prompt, and the shortening of the passage, were the major revisions in this item.

The next item is an example of a review item in which an attempt to fade cues had been made. The fading was apparently too sharp, since all three subjects found the item confusing.

Original Item

The earliest form of communication was through ________________. This was followed by the development of __________ and then ____________________ symbols.

The subjects had no difficulty with the first responses, "signs," but gave a variety of responses to the second blank, and responded to the third blank with "alphabet." (The desired responses were: signs, verbal, written.) This item was intended to test the learner's understanding that communication developed from signs through spoken and then to written symbols. The exclusion of the word "symbols" after the second blank increased the confusion. Obviously, the item did not test what it was intended to test.

Revised Item

The earliest form of communication was through ________________. This was followed by the development of (spoken/written) ______________ symbols, and then by (spoken/written) ________________ symbols.

The addition of the alternative responses apparently structured the selection of the response to the extent that the ambiguity was eliminated.

The next item was also a review item.

Original Item

The most prevalent beginning and ending stroke in cursive writing, then, is the

________________.

The beginning ________________ always starts at the ______________ line of a writing space.

The ending ________________ is the same height as ________________ letters.

Three concepts were reviewed in this item: (1) the prevalence of the UPSTROKE; (2) the point at which the UPSTROKE is begun at the BASE line of the writing space; and (3) the height of the ending UPSTROKE--the same height as SMALL letters. (The words which are capitalized are the responses to the blanks in the item.)

Too many concepts, as well as too many blanks in one item, created the confusion. The item was therefore rewritten as two items.

Revised Item 1

A large number of cursive letters also end in an upstroke. As a matter of fact, the most prevalent beginning and ending stroke is the UPSTROKE.

When we connect a letter which ends in an upstroke to a letter which begins with an upstroke, our connecting stroke is also an ________________.

(Illustration)

The majority of the letters in the cursive capital and lower-case alphabets begin and end in an upstroke; therefore, the most prevalent BEGINNING, ENDING, and CONNECTING STROKE is the ________________________.

Revised Item 2

The ENDING UPSTROKE is generally the same height as lower-case SHORT letters (letters without ascenders or descenders).

Write the letters shown below.

(Illustration)

Be sure that each ending upstroke is the same height as each letter.

(Space for writing)

The first unit of the program contained 53 items and was an entity in itself. Few errors were made in this unit during the initial field testing. The second unit, however, was divided into eight sets containing a total of 343 items as well as an additional 16 pages of discussion and information. The second unit further included one branching set.

The number of errors made in review items contained in these sets in the second unit which were concerned with the historical development of the English alphabet system and the manuscript and cursive writing styles was excessive. These errors, as well as the negative nature of the subjects' comments and suggestions with regard to these sets, led to the elimination of the branched set on historical developments of the alphabet, and the removal of certain items from the set concerned with the historical development of the two writing styles. The set which dealt with the comparison of the manuscript and cursive alphabets was generally felt to be overly repetitious and therefore boring. The items in this set were therefore analyzed for content and only those items which contained concepts essential to the learner's progression through the remainder of the program were retained.

These revisions and modifications led to the second revision of the course outline described earlier in this chapter and presented in Appendix E. Items for the fourth unit were written based on this final revision of the course outline. Revisions and modifications of items in the fourth unit were made following the initial field testing of these items with the same subjects.

The program was then critically examined for content and organizational strength by a subject matter consultant experienced in handwriting instruction at all levels of the elementary school.[5] In addition, the items were read by an editorial consultant, who provided a critical analysis of the items in terms of both grammatical and spelling accuracy and style.

The investigator and subject matter consultant then reviewed all of the available information concerning what was at that time the current status of the program: evidence of student performance during field testing; results of the editorial review and suggestions for modifications in items made by the editorial consultant; omissions or errors in item content and illustrative materials discovered during the subject matter review. Final revisions in both the items and item sequences were made jointly by the investigator and the subject matter consultant.

The final version of the program which was reproduced for field trial was composed of a non-programmed introduction, several non-programmed informational and directional sections, and four programmed units containing sixteen sets. The Table of Contents of the program, as well as the number of items included in each unit and set, appears as Appendix H.

Evaluation and Revision

The two remaining steps in the programming process, program evaluation and revision, will be discussed in succeeding chapters. Evaluation of the extent to which those terminal behaviors specified in the behavioral objectives have been attained is an essential phase of the programming process. Such appraisal is also an integral component in the theoretical framework upon which this research is based.

Instrumentation, evidences of student performance, findings based on the results of pre- and posttest performance and implications both for the revision of the program and its utilization as an instructional medium will therefore be included in the content of the chapters which follow.

Chapter IV

Methodology and Procedures

The major purpose of this research was to investigate the effectiveness of a self-instructional program in the teaching of handwriting. This program was designed to teach special subject matter knowledge and skill in handwriting as well as knowledge and understanding of educational method in handwriting instruction. The procedures used in the investigation therefore included: (1) the development and administration of programmed instructional units in the teaching of handwriting and (2) the development and administration of a test instrument designed to measure knowledge and skill in teaching handwriting.

The development of the program was described in Chapter III. This chapter will therefore be concerned with the following areas: (1) research design; (2) description of the population; (3) collection of the data; and (4) treatment of the data.

Research Design

A nonequivalent control group design developed by Campbell and Stanley (1963) was used as the basic research design for this study. This design involves an experimental and control group, both given a pretest and posttest, but in which these groups do not have pre-experimental sampling equivalence. Rather, the groups constitute naturally assembled collectives, in this case classrooms, and the assignment of the subjects to one group or another is assumed to be random.

Campbell and Stanley (1963) have further suggested that, where one has the alternative of using intact classrooms or taking random samples of students out of the classroom for different experimental treatments, the latter is almost certain to be the more reactive and therefore the less desirable. Therefore intact classroom groups were used in this study.

The Population

The programmed instructional units used in this study were developed in accordance with the following descriptions of the learners:

1. The learners' ability level and undergraduate record are such that they are currently enrolled in a program of teacher education at the elementary grade level.
2. The learners' purpose is to teach at that level.
3. The learners have had no formal instruction in the teaching of handwriting.

The subjects were full-time undergraduate students majoring in elementary education at Auburn University in Alabama and the University of Rochester in New York State who met these descriptions.

The study involved four groups of subjects. Three of these consisted of students enrolled in the specific educational methods course which dealt with the teaching of handwriting. Of these groups, two received the programmed instructional units while the third received conventional classroom instruction. The fourth group, designated control, did not receive any formal instruction in the teaching of handwriting.

Experimental Group at Auburn University. This population consisted of 50 students enrolled in the two sections of Education 370: Teaching Basic Skills, offered during the Spring term of 1965. This group received the pretest, posttest, and programmed instructional units. For purposes of data analysis, this group was designated A_1.

Experimental Group at the University of Rochester. This population consisted of 23 students enrolled in the one section of Education 221: The Elementary School Curriculum, offered during the Spring term of 1965. These subjects received the pretest, posttest, and programmed instructional units. For purposes of data analysis, this group was designated R_1.

Comparative Group at Auburn University. This population consisted of 30 students enrolled in the one section of Education 370: Teaching Basic Skills, offered during the Winter term of 1965. These subjects received the pretest, posttest, and received classroom instruction provided by the investigator. For purposes of data analysis, this group was designated A_2.

Control Group at Auburn University. This population comprised 47 elementary education majors enrolled in Education 200: Foundations of Education, during the Spring term of 1965. These subjects received the pretest and posttest, but did not receive formal instruction in teaching handwriting. For purposes of data analysis, this group was designated A_3.

Collection of the Data

The data used in this study were collected during the months of March and April, 1965.

Objective Achievement Test. The first part of the test instrument constructed for this investigation consisted of an objective achievement test in which multiple choice and completion items were utilized to measure knowledges and understandings of educational methodology in handwriting instruction.

In order to assure optimum representation of both the content and instructional aims of the programmed units, the objective achievement test was designed from a two-way chart (Lysaught & Williams, 1963, pp. 138-139). This chart is presented in Appendix I. An initial set of items was field tested with six students who met the descriptions of the learners and with six student teachers who had received about two hours of formal instruction in handwriting as part of a language arts course. Items were revised or discarded and additional items were written based on an analysis of the responses to these initial items. The field testing was then repeated with six additional subjects with similar backgrounds. Again, item revisions and additions were made based on an item analysis.

A preliminary version of the test instrument was then constructed. Each item was reviewed for content accuracy by the subject matter consultant and proofread by the editorial consultant. Several items were discarded or revised based on the recommendations of these consultants. This preliminary instrument was administered to 36 students in elementary education at Auburn University.

Items were selected for inclusion in the final field test version based on an analysis of student responses to items on the preliminary instrument. The final test version consisted of two sections, the first of which contained 40 multiple choice items and one item which required the selection of five responses from a total of 11 responses. The total possible score on this multiple choice section was 46. The second section contained 24 completion items requiring a total of 44 responses as well as four listing items each requiring five responses. The total possible score on this section was 64. Appendix J contains the preliminary and final field test versions of the test instrument.

Split-half reliability for the final field test version was .87.

Handwriting Samples. The second part of the test instrument consisted of a requirement for the subject to write, in both manuscript and cursive styles, several prescribed sentences which were used as a measure of ability to provide manuscript and cursive handwriting models for elementary school children.

"The quick brown fox jumps over the lazy dog." was selected as the manuscript prescribed sentence since it includes all of the letters in the alphabet.

In order to avoid the practice effect of the manuscript sample on the cursive one, the first three sentences of the Gettysburg Address were used as the prescribed cursive sample.

These manuscript and cursive handwriting samples were evaluated by a panel of three judges in accordance with accepted criteria for rating handwriting. These samples were coded and no information was given to the judges as to which were pretest or posttest samples. Each handwriting sample was rated by each judge on a point scale, with one the lowest and five the highest possible score. The average of these three ratings was assigned to each sample.

Background information for the three judges is presented in Table 1.

Table 1

Personal, Educational, and Professional Backgrounds of the Three Handwriting Judges

	Judge		
Item	A	B	C
Sex	Female	Female	Female
Age Range	50-55	25-35	25-35
Highest Educational Degree	B. A.	M. A.	M. S.
Years Taught	21	8	8
Elementary Grades Taught	Fifth Sixth	First	First Second Third Fourth
Other Grades Taught or Subjects Taught	High School English Jr. High School English	None	Librarian
Grade Currently Teaching	Sixth	First	Second
States in Which Teaching Experience Occurred	Alabama Arkansas	Alabama	Alabama California Florida Illinois

Administration of Tests and Instruction. The same schedule of data collection was followed with all groups. (See Appendix K.) Testing and instruction took place during five consecutive two-hour class sessions. Both were conducted by the investigator.

Treatment of the Data

Two major sets of data were obtained as a result of the test administration. One set consisted of pretest and posttest scores on the objective portion of the test instrument, while the other comprised the pretest and posttest ratings of each subject's manuscript and cursive writing. Data concerning the time required by the subjects to complete each programmed set and unit were also collected.

For purposes of data analysis, the null hypotheses were separated into two major groups. In testing these hypotheses, different populations were used.

The first group of hypotheses dealt with the effect of programmed instruction on: (1) the ability of preservice teachers to provide handwriting instruction and (2) the ability of preservice teachers to provide handwriting models in both manuscript and cursive writing styles.

H_o1. There will be no significant difference between pre- and posttest scores on an objective achievement test in handwriting instruction obtained by subjects receiving programmed instructional units in the teaching of handwriting.

H_o2. There will be no significant difference between pre- and posttest ratings of model manuscript handwriting samples obtained from subjects receiving programmed instructional units in the teaching of handwriting.

H_o3. There will be no significant difference between pre- and posttest ratings of model cursive handwriting samples obtained from subjects receiving programmed instructional units in the teaching of handwriting.

The second group of hypotheses was concerned with the comparative effectiveness of programmed instruction and conventional classroom instruction on: (1) the ability of preservice teachers to provide handwriting instruction and (2) the ability of preservice teachers to provide handwriting models in both manuscript and cursive writing styles.

H_o4. There will be no significant difference between posttest scores on an objective achievement test in handwriting instruction obtained by subjects receiving programmed instruction and subjects receiving conventional classroom instruction in the teaching of handwriting.

H_o5. There will be no significant difference between posttest ratings of model manuscript handwriting samples obtained by subjects receiving programmed instruction and subjects receiving conventional classroom instruction in the teaching of handwriting.

H_o6. There will be no significant difference between posttest ratings of model cursive handwriting samples obtained by subjects receiving programmed instruction and subjects reciving conventional classroom instruction in the teaching of handwriting.

In an effort to test the first set of hypotheses, objective achievement test scores and ratings of handwriting samples of experimental groups R_1 and A_1 were analyzed. The second set of hypotheses were tested through an analysis of the objective achievement test scores and ratings of handwriting samples of groups R_1, A_1, A_2, and A_3.

Statistical Analyses. Analysis of variance and covariance were computed for all groups. F ratios were tested for significance using Snedecor's Tables (Guilford, 1956). Significance was further determined by Fisher's t Test for Correlated Means (Guilford, 1956). Significance was set at the .01 level of confidence throughout.

H_o1. Comparisons of objective achievement pre- and posttest scores were made for groups R_1 and A_1.

H_o2. Comparisons of pre- and posttest ratings of model manuscript writing samples were made for groups R_1 and A_1.

H_o3. Comparisons of pre- and posttest ratings of model cursive writing samples were made for groups R_1 and A_1.

H_o4. Comparisons of objective achievement pre- and posttest scores were made for groups R_1, A_1, A_2, and A_3 and also for groups A_1, A_2, and A_3. Computation of t values was made for each of the following pairs of groups: R_1 and A_1; A_1 and A_2; A_2 and A_3; and A_1 and A_3.

H_o5. Comparisons of pre- and posttest ratings of model manuscript writing samples were made for groups R_1, A_1, A_2, and A_3 and also for groups A_1, A_2, and A_3.

Computation of t values was made for each of the following pairs of groups: R_1 and A_1; A_1 and A_2; A_2 and A_3; A_1 and A_3.

H_o6. Comparisons of pre- and posttest ratings of model cursive writing samples were made for groups R_1, A_1, A_2, and A_3 and also for groups A_1, A_2, and A_3. Computation of t values was made for each of the following pairs of groups: R_1 and A_1; A_1 and A_2; A_2 and A_3; A_1 and A_3.

Additional Data Analyses--Inter-rater Reliability. Pearson's Product Moment Coefficient of Correlation (Guilford, 1956) was used to determine inter-rater reliability. Correlations were based on ratings of both manuscript and cursive writing samples obtained by the four subject groups. Coefficients of correlation were obtained between independent ratings as well as between independent and average ratings. These data are reported in Table 2.

By inspection of Table 2, it can be seen that the inter-rater reliability was very high.

Program Completion Times. Individual completion time for each set and each unit was analyzed. Comparison was made of the total completion times of groups R_1 and A_1. A further analysis of completion times and their relation to final test scores was made using Spearman's Rank-Difference Correlation Method (Guilford, 1956).

Table 2

Coefficients of Correlation for Ratings of Handwriting Samples Provided by the Three Handwriting Judges

Judges	Manuscript		Cursive	
	Pretest	Posttest	Pretest	Posttest
	r	r	r	r
A & B	.866	.929	.832	.864
A & C	.835	.917	.774	.870
B & C	.877	.936	.814	.888
A & Average	.917	.962	.899	.933
B & Average	.951	.967	.922	.941
C & Average	.919	.954	.888	.950

Chapter V

Findings of the Study

This research was primarily designed to determine the effectiveness of using a sequence of programmed units in the teaching of handwriting as a technique for teaching preservice teachers to provide handwriting instruction. The study focused on two primary questions: (1) does the use of programmed learning materials as an instructional medium increase the ability of preservice teachers to provide instruction in handwriting to children at the elementary grade level? and (2) does the use of programmed learning materials as an instructional medium increase the ability of preservice teachers to provide handwriting models in both manuscript and cursive writing styles for children at the elementary grade level?

Since most current instruction in the teaching of handwriting takes place in a traditional classroom setting, and since lack of sufficient time for the adequate provision of such instruction is a continuing concern for teacher educators, a secondary question with which the study dealt was: If a programmed course in handwriting instruction can teach, to what level of proficiency does it teach when compared with conventional classroom instruction?

The findings with respect to the six null hypotheses tested are presented in two major categories. For purposes of data analysis, these null hypotheses were separated into two groups, and different populations were used in testing these hypotheses. In the first section of this chapter, the results of the testing of the first set of hypotheses, which dealt with the effect of programmed instruction on the subjects' ability to provide handwriting instruction and handwriting models, are reported and analyzed. Results of the testing of the second set of hypotheses, which were concerned with determining the comparative effectiveness of programmed instruction and conventional classroom instruction in the teaching of handwriting, are reported and analyzed in the second section.

Date dealing with an analysis of completion times reported by each subject for each set and unit are reported in the third section of this chapter.

The Effect of Programmed Instruction

The results of a comparison of knowledge of the course material before the administration of the programmed instructional units (pretest data) with knowledge after its administration (posttest data) are reported in Table 3. For both experimental groups A_1 and R_1, achievement scores after instruction were significantly higher than prior to instruction. By reference to Table 3 it will also be noted that, while group A_1 showed the greater gain (66.98), the posttest means of the two experimental groups differed by only 1.14 points.

These results permitted the rejection of null hypothesis 1 at the .01 level of confidence.

For hypotheses 2 and 3, comparisons were made of ability to write model manuscript and cursive sentences prior to and following the programmed instruction. The results of these comparisons are presented in Tables 4 and 5. Ability to write both model manuscript and cursive sentences was significantly higher for both experimental groups after instruction. Inspection of Tables 4 and 5 further indicates that, while

Table 3

Means, Standard Deviations, _t_ Values and Levels of Significance for Pretest and Posttest Achievement Scores for Groups R_1 and A_1

	Group	N	Pretest	Posttest	Gain	_t_	Level of Significance
R_1	Rochester	23					
	Mean		31.20	90.00	58.78	28.18	.01
	Standard Deviation		7.23	6.57			
	Range		17-42	78-103			
A_1	Auburn	50					
	Mean		21.88	88.86	66.98	40.42	.01
	Standard Deviation		7.78	8.99			
	Range		5-38	57-107			

Table 4

Means, Standard Deviations, _t_ Values and Levels of Significance for Pretest and Posttest Manuscript Ratings for Groups R_1 and A_1

	Group	N	Pretest	Posttest	Gain	_t_	Level of Significance
R_1	Rochester	23					
	Mean		2.52	3.83	1.31	4.16	.01
	Standard Deviation		.97	1.19			
	Range		1-5	1-5			
A_1	Auburn	50					
	Mean		2.22	3.68	1.46	7.73	.01
	Standard Deviation		.97	.90			
	Range		1-4	1-5			

Table 5

Means, Standard Deviations t Values and Levels of Significance for Pretest and Posttest Cursive Ratings for Groups R_1 and A_1

	Group	N	Pretest	Posttest	Gain	t	Level of Significance
R_1	Rochester	23					
	Mean		2.44	3.48	1.04	3.56	.01
	Standard Deviation		.88	1.06			
	Range		1-4	2-5			
A_1	Auburn	50					
	Mean		2.10	3.62	1.52	8.31	.01
	Standard Deviation		.86	.96			
	Range		1-4	1-5			

group A_1 showed the greater gain in both the manuscript (1.46) and cursive (1.52) ratings, the manuscript posttest means were very similar for both the experimental groups, as were the cursive posttest means.

These findings were significant beyond the .01 level of confidence, and null hypotheses 2 and 3 were therefore rejected.

The Comparative Effect of the Instructional Treatments

Null hypothesis 4 dealt with the comparative effect of programmed and conventional instruction in teaching handwriting. Comparisons of the objective achievement pretest scores of the four subject groups revealed significant differences in these scores. However, when the three groups at Auburn were compared separately, the pretest scores were not significantly different. Recognizing these differences, two separate posttest analyses were performed, one using all four subject groups, and one using only the three groups at Auburn. Differences in pretest means were controlled by covariance. The results of these analyses are presented in Tables 6 and 7.

Comparisons of the objective achievement scores of the four subject groups and the three subject groups at Auburn revealed significant differences in posttest scores. Inspection of Tables 6 and 7 further reveals that differences in adjusted posttest means obtained through analysis of covariance were even greater.

These findings permitted the rejection of null hypothesis 4.

In order to determine more specifically where the significant differences lay, and which treatments had produced them, intergroup comparisons of posttest scores were made. The results of these comparisons are reported in Table 8. Significant differences in

Table 6

F Values and Significances
From an Analysis of Variance and Covariance
For Pretest and Posttest Achievement Scores of all Groups
With a Separate Analysis for the Auburn Group

Groups	N	Pretest		Posttest		Adjusted Posttest	
		F	Level of Significance	F	Level of Significance	F	Level of Significance
R_1, A_1, A_2, A_3	150	14.55	.01	594.27	.01	639.91	.01
A_1, A_2, A_3	127	4.50	N.S.	700.44	.01	819.92	.01

Table 7

Means, Standard Deviations, _t_ Values and Levels of Significance for Pretest and Posttest Achievement Scores for Groups R_1, A_1, A_2 and A_3

Group	N	Pretest	Posttest	Gain	_t_	Level of Significance
R_1 Rochester	23					
Mean		31.20	90.00	58.78	28.18	.01
Standard Deviation		7.23	6.57			
Range		17-42	78-103			
A_1 Auburn	50					
Mean		21.88	88.86	66.98	40.42	.01
Standard Deviation		7.78	8.99			
Range		5.38	57-107			
A_2 Auburn	30					
Mean		24.73	59.97	35.24	16.92	.01
Standard Deviation		5.86	9.66			
Range		11-40	36-80			
A_3 Auburn	47					
Mean		19.85	21.70	1.85	1.24	N.S.
Standard Deviation		6.48	7.81			
Range		7-34	8-38			

Table 8

t Values and Significances of Intergroup Comparisons of Posttest Achievement Scores

Groups	N	t	Significance
R_1, A_1	73	.6	N.S.
A_1, A_2	80	13.11	.01
A_2, A_3	77	17.11	.01
A_1, A_3	97	38.98	.01

posttest means were found between all of the groups except the experimental ones.

Null hypotheses 5 and 6 were concerned with the comparative effect of programmed and conventional instruction on the ability to provide manuscript and cursive handwriting models. Comparisons of the manuscript pretest ratings of the four subject groups revealed significant differences in these ratings. When the three groups at Auburn were compared separately, these pretest ratings were also significantly different. Posttest analyses were therefore performed in which differences in these pretest means were controlled by covariance. The results of these analyses are presented in Tables 9 and 10. Comparisons of the ratings of the four subject groups and the three subject groups at Auburn revealed significant differences in posttest ratings. Examination of these tables reveals that differences in adjusted posttest means through analysis of covariance were not as great, but were still significant beyond the .01 level.

These findings permitted the rejection of null hypothesis 5.

Comparisons of the cursive pretest ratings of the four subject groups showed no significant differences in these ratings. When the three groups at Auburn were compared separately, these pretest ratings were not significantly different either. However, some differences in pretest means did appear, and posttest analyses were therefore performed in which these differences could be controlled. The results of these analyses are reported in Tables 11 and 12. Comparisons of the cursive ratings of the four subject groups and the three subject groups at Auburn revealed significant differences in posttest ratings. Differences

Table 9

$\underline{F}$ Values and Significances

From an Analysis of Variance and Covariance

For Pretest and Posttest Achievement Scores of all Groups

With a Separate Analysis for the Auburn Groups

		Pretest		Posttest		Adjusted Posttest	
Groups	N	$\underline{F}$	Level of Significance	$\underline{F}$	Level of Significance	$\underline{F}$	Level of Significance
B_1, A_1, A_2, A_3	150	11.21	.01	38.97	.01	26.47	.01
A_1, A_2, A_3	127	14.52	.01	52.91	.01	38.92	.01

TABLE 10

Means, Standard Deviations, t Values and Levels of Significance for Pretest and Posttest Manuscript Ratings for Groups R_1, A_1, A_2, and A_3

	Group	N	Pretest	Posttest	Gain	t	Level of Significance
R_1	Rochester	23					
	Mean		2.52	3.83	1.31	4.16	.01
	Standard Deviation		.97	1.19			
	Range		1-5	1-5			
A_1	Auburn	50					
	Mean		2.22	3.68	1.46	7.73	.01
	Standard Deviation		.97	.90			
	Range		1-4	1-5			
A_2	Auburn	30					
	Mean		2.50	3.23	.73	2.94	.01
	Standard Deviation		.72	1.15			
	Range		1-4	1-5			
A_3	Auburn	47					
	Mean		1.53	1.70	.17	1.01	N.S.
	Standard Deviation		.71	.90			
	Range		1-4	1-4			

Table 11

F Values and Significances

From an Analysis of Variance and Covariance

for Pretest and Posttest Cursive Ratings of all Groups

With a Separate Analysis for the Auburn Group

Groups	N	Pretest		Posttest		Adjusted Posttest	
		F	Level of Significance	F	Level of Significance	F	Level of Significance
R_1, A_1, A_2, A_3	150	3.26	N.S.	35.04	.01	39.40	.01
A_1, A_2, A_3	127	2.99	N.S.	51.23	.01	62.51	.01

Table 12

Means, Standard Deviations, t Values

and Levels of Significance for Pretest and Posttest

Cursive Ratings for Groups R_1, A_1, A_2, and A_3

	Group	N	Pretest	Posttest	Gain	t	Level of Significance
R_1	Rochester	23					
	Mean		2.44	3.48	1.04	3.56	.01
	Standard Deviation		.88	1.06			
	Range		1-4	2-5			
A_1	Auburn	50					
	Mean		2.10	3.62	1.52	8.31	.01
	Standard Deviation		.86	.96			
	Range		1-4	1-5			
A_2	Auburn	47					
	Mean		2.30	3.40	1.10	4.52	.01
	Standard Deviation		.94	.92			
	Range		1-4	1-5			
A_3	Auburn	30					
	Mean		1.81	1.79	-.02	.114	N.S.
	Standard Deviation		.87	.92			
	Range		1-4	1-4			

in adjusted posttest means were found to be even greater.

Null hypothesis 6 was therefore rejected.

Intergroup comparisons of posttest ratings of both manuscript and cursive writing samples are presented in Table 13. Examination of this table indicates the existence of significant differences in both manuscript and cursive posttest means between groups A_1 and A_3 (experimental and control groups) and A_2 and A_3 (comparative and control groups). No significant differences were found between the posttest means of the two experimental groups or the Auburn experimental and comparative groups. An examination of the posttest means of these latter groups (A_1 and A_2), however, revealed that both the manuscript and cursive posttest means for Group A_1 were higher than those of A_2.

A summary of the significance testing of the hypotheses is presented in Table 14.

Program Times

An analysis was made of the time required by each subject to complete the individual units and sets. The results of this analysis are reported in Tables 15 and 16.

The time range for completion of the entire program by the Rochester group was six and one-half hours. The Auburn group required from six to thirteen hours to complete the program. The average completion time was seven hours and forty-two minutes for the Rochester group and eight hours and fifty-three minutes for the Auburn group. It is interesting to note that the lowest pretest score and the highest posttest score were also found in the Auburn group.

Table 13

t Values and Significances of Intergroup Comparisons of Posttest Manuscript and Cursive Ratings

		Manuscript		Cursive	
Groups	N	t	Level of Significance	t	Level of Significance
A_1, R_1	73	.52	N.S.	.54	N.S.
A_1, A_2	80	1.80	N.S.	1.01	N.S.
A_2, A_3	77	6.12	.01	7.62	.01
A_1, A_3	97	10.68	.01	9.52	.01

Table 14

Table of Significance Testing of Hypotheses

Hypo-theses	R_1		A_1		A_2		A_3		R_1,A_1,A_2,A_3		A_1,A_2,A_3		R_1,A_1		A_1,A_3		A_1,A_2		A_2,A_3	
	t	Lvl. of Sig.	t	Lvl. of Sig.	t	Lvl. of Sig.	t	Lvl. of Sig.	t	Lvl. of Sig.	t	Lvl. of Sig.	t	Lvl. of Sig.	t	Lvl. of Sig.	t	Lvl. of Sig.	t	Lvl. of Sig.
1	28.18	.01	40.42	.01	16.92	.01	1.24	N.S.												
2	4.16	.01	7.73	.01	2.94	.01	1.01	N.S.												
3	3.56	.01	8.31	.01	4.52	.01	.11	N.S.												
4									24.16	.01	26.46	.01	.6	N.S.	38.98	.01	13.11	.01	17.96	.01
5									6.24	.01	7.28	.01	.52	N.S.	10.68	.01	1.80	N.S.	6.12	.01
6									5.92	.01	7.14	.01	.54	N.S.	9.52	.01	1.01	N.S.	7.62	.01

Table 15

Total Completion Times, Mean Completion Times,

and Time Ranges by Set and Unit for R_1

Unit Number	Total Minutes	Mean Minutes	Range
Unit 1			
Set 1	413	22	14-33
2	362	19	15-30
3	538	28	17-55
Total	1,313	69	49-120
Unit 2			
Set 1	1,270	67	50-100
2	711	37	25-75
Total	1,981	104	70-145
Unit 3			
Set 1	1,170	62	40-90
2	638	34	25-75
3	467	24	15-35
Total	2,275	120	90-168
Unit 4			
Set 1	463	24	15-60
2	420	21	15-40
3	373	20	15-30
4	319	17	13-20
5	493	26	20-40
6	603	32	20-55
7	329	17	5-30
8	239	12	7-15
Total	3,204	169	120-213
Total Program	8,753	462	390-532
		(7 hrs. 42 min.)	(6 hrs. - 8 hrs.) (30 min. - 50 min.)

Table 16

Total Completion Times, Mean Completion Times, and Time Ranges by Set and Unit for A_1

Unit Number	Total Minutes	Mean Minutes	Range
Unit 1			
Set 1	915	25	10-40
2	885	24	13-35
3	1,169	32	15-50
Total	2,969	81	48-113
Unit 2			
Set 1	3,246	83	50-210
2	1,600	43	20-95
Total	4,846	131	80-180
Unit 3			
Set 1	2,202	59	30-110
2	1,243	33	15-60
3	906	25	10-40
Total	4,351	117	55-175
Unit 4			
Set 1	933	25	10=45
2	968	27	9-60
3	826	23	10=45
4	804	22	10-45
5	1,289	33	20-60
6	1,444	39	20-60
7	733	20	10-60
8	556	15	10-30
Total	7,553	204	131-353
Total Program	19,719	533	358-785
		(8 hrs. 53 min.)	(5 hrs. - 13 hrs.) (58 min. 5 min.)

The results of an analysis of the relationship between completion times and objectives achievement posttest scores may be found in Tables 17 and 18. By reference to these tables, it will be noted that the correlations between completion time and test scores for the Rochester group was .61, indicating that the longer the subjects worked on the program, the higher their test scores were likely to be. The Auburn group, however, was quite different in that a comparison of their posttest scores and completion times resulted in a low negative correlation of -.30. While the relationship between scores and completion times was small, it would appear that the Auburn subjects who took a longer period of time to complete the program tended to obtain lower scores on the posttest.

Program Revision

An analysis of the responses to the program items revealed very few errors. In addition, the error distribution was very small, indicating that the present sequence and structure of the items did not cause a significant number of subjects to respond incorrectly.

In several cases, the nature of the responses suggested revisions which might improve the effectiveness of the items. An example of this is found in the following item, in which an inappropriate prompt cued an equally inappropriate response.

Table 17

Individual Record of Total Program Completion Time and Posttest Achievement Scores with a Correlation for R_1[a]

Individual	Total Time (Minutes)	Achievement Score
1	385	78
2	390	80
3	402	96
4	413	84
5	416	85
6	425	98
7	430	88
8	437	87
9	450	103
10	455	94
11	474	92
12	479	94
13	487	95
14	500	97
15	502	94
16	520	88
17	526	89
18	530	86
19	532	95

$r = .61$

[a] N = 19; four subjects did not record times.

Table 18

Individual Record of Total Program Completion Time and Posttest Achievement Scores with a Correlation for A_1[a]

Individual	Total Time (Minutes)	Achievement Score
1	358	92
2	381	91
3	392	92
4	394	97
5	445	94
6	449	98
7	454	99
8	460	91
9	472	92
10	485	86
11	486	84
12	497	93
13	499	92
14	515	97
15	517	91
16	517	89
17	522	91
18	522	98
19	522	101
20	523	96
21	527	100
22	532	90
23	545	107
24	556	75
25	563	83
26	585	87
27	588	80
28	590	94
29	595	103
30	596	85
31	617	87
32	625	79
33	641	76
34	635	82
35	664	97
36	665	91
37	785	92

$r = -.30$

[a] N = 37; 13 subjects did not record times.

In teaching the left-handed child to write in cursive style, the teacher who understands the physiology of movement will not be concerned with the DIRECTION of the slant. She will be concerned only that the slant is ____________________ so that the writing will be legible.

A number of subjects responded to this item with DIRECTED, which is not meaningful in terms of either the previous content of the program or the wording of the item itself. (The correct response is UNIFORM.) These subjects had apparently responded with the correct grammatical form of the capitalized prompt, without considering the concept involved. Removal of the prompt by printing the capitalized word in lower-case letters should prevent the occurrence of the undesired response.

Another example is provided in the following item:

History has a way of repeating itself. In the days of early Rome, the need for a less formal writing style resulted in the development of Roman Cursive. The need for a less formal writing style during the Renaissance again resulted in the development of a ____________________ writing style.

Despite the provision of only one blank, the response generally given to this item was LESS FORMAL. While this was not incorrect, the desired response in terms of the concept being developed was CURSIVE. The undesired response should be eliminated by the following revision:

> History has a way of repeating itself. In the days of early Rome, the need for a less formal writing style resulted in the development of the Roman Cursive writing style. The need for a less formal writing style during the Renaissance again resulted in the development of a less formal or ____________________ writing style.

The response analysis clearly indicated that subjects continued to respond correctly to subsequent items even where errors were made. The analysis further revealed that subjects performed in accordance with the stated behavioral objectives of the program. This is consistent with the findings reported earlier in this chapter.

Chapter VI

Summary and Conclusions

The primary purpose of this study was to develop and test a sequence of auto-instructional materials in the teaching of handwriting in order to answer two questions: (1) does the use of programmed learning materials as an instructional medium increase the ability of preservice teachers to provide instruction in handwriting to children at the elementary grade level? and (2) does the use of programmed learning materials as an instructional medium increase the ability of preservice teachers to provide handwriting models in both manuscript and cursive styles for children at the elementary grade level? A secondary issue upon which the study focused was: If a programmed course in handwriting can teach, to what level of proficiency does it teach when compared with conventional classroom instruction?

The procedures used in this investigation included the development and administration of programmed instructional units in the teaching of handwriting. In addition, a test instrument designed to measure knowledge of educational methodology in handwriting and ability to provide manuscript and cursive handwriting models was developed. This instrument was administered to four subject groups. Of these, two received the programmed units, one received conventional classroom instruction, and one received no formal instruction in the teaching of handwriting.

Six null hypotheses were tested in the study. The first three dealt with the effect of programmed learning sequences on the subjects' ability to provide handwriting instruction and handwriting models in manuscript and cursive styles. The remaining null hypotheses dealt with a comparison of the effect of programmed learning sequences and conventional teaching on the subjects' ability to provide handwriting instruction and manuscript and cursive handwriting models. All of the null hypotheses were rejected, indicating that the specified instructional objectives can be met by programmed learning sequences and at a level of proficiency which is equal to or higher than that attained through conventional classroom instruction.

Conclusions:

From an analysis of the data, the following conclusions can be drawn:

1. The use of programmed learning materials is effective in increasing the ability of preservice teachers to provide instruction in handwriting to children at the elementary grade level.
2. The use of programmed learning materials is effective in increasing the ability of preservice teachers to provide handwriting models in both manuscript and cursive styles to children at the elementary grade level.
3. The use of programmed learning materials is more effective than conventional classroom teaching in increasing the proficiency of preservice teachers in providing handwriting instruction.

4. The use of programmed learning materials is as effective as conventional classroom teaching in increasing the proficiency of preservice teachers in providing handwriting models in both manuscript and cursive styles.
5. Unless preservice teachers receive instruction in the teaching of handwriting, it is clear that they develop neither knowledge of educational methodology in this area nor ability to provide handwriting models in either manuscript or cursive styles.
6. The relationship between program completion time and ability to provide handwriting instruction is not clear. It must be concluded that the inconsistent findings in this area require that judgement be suspended until further evidence is available.

Educational Implications

1. There is no justification for the current lack of attention given handwriting in programs of teacher education, since the results of this study clearly indicate that programmed instruction offers a medium through which instruction in this area can be provided both effectively and efficiently outside the classroom.
2. Programmed instruction is particularly effective in developing those aspects of preservice teacher education which involve both cognitive and motor skills.

3. Programmed instruction may be an equally useful technique in other areas of preservice teacher education.

Recommendations for Further Study

1. Research designed to develop and test programmed learning sequences in the teaching of other subject areas at the elementary grade level.
2. Replication of this study with inservice teachers.
3. Investigation of the effect of the programmed materials used in this study in terms of specific individual characteristics of the learners.
4. Investigation of the relationship between program completion time variables and knowledge of educational methodology in handwriting.

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Footnotes

[1] A prompt is a device which increases the probability that, from a set of alternatives, a particular response will come to be emitted. An event which sets the occasion upon which a response will be reinforced is called a discriminative stimulus. A formal prompt is a discriminative stimulus which has a form designed to increase the probability of a particular response.

[2] A thematic prompt is a discriminative stimulus which has a theme designed to increase the probability of a particular response. The thematic prompt may be in the form of a hint. It differs from the formal prompt in the directness with which it is used. The formal prompt is generally a direct cue, whereas the thematic prompt is more subtle or may be concealed in language.

[3] Fading or vanishing consists of the withdrawal of stimulus support. It lends itself particularly well to material where visual discriminations are important, and is therefore a very useful technique in programming material concerned with handwriting.

[4] A problem encountered here was the subjects' tendency to erase the incorrect response and substitute the correct one, rather than write the correct response next to the error as directed. It was not until the subjects became secure in the knowledge that this was not a testing situation, that no grade was involved, and that they would not be considered incompetent because they made errors, that this problem was overcome.

[5] Since the programmer in this case was also an experienced handwriting teacher, the subject matter consultant was brought in at this point rather than earlier in the development of the program.

Appendix A

Model Manuscript and Cursive
Letter and Number Forms

(Exhibits 1-9)

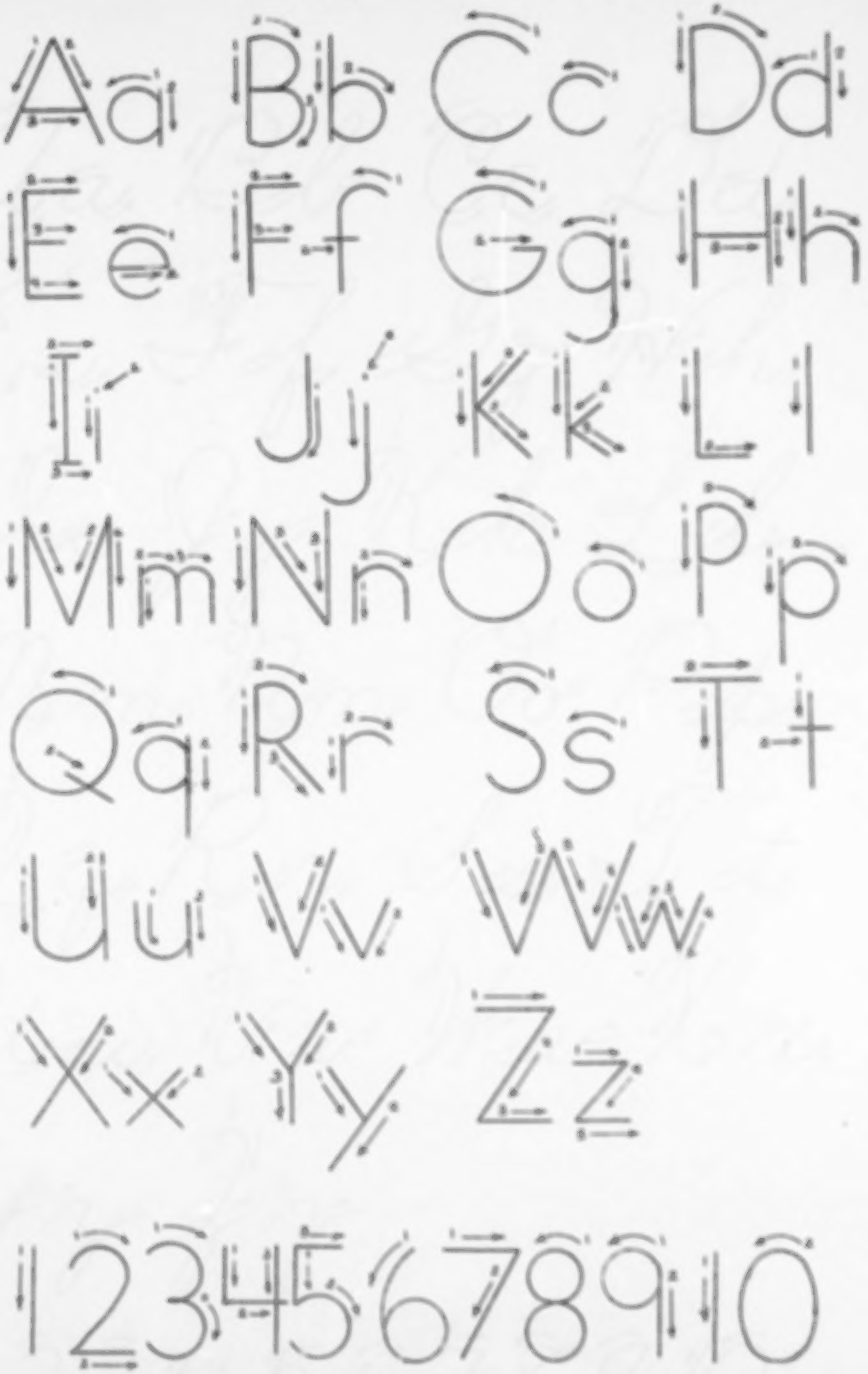

Aa Bb Cc Dd
Ee Ff Gg Hh
Ii Jj Kk Ll
Mm Nn Oo Pp
Qq Rr Ss Tt
Uu Vv Ww
Xx Yy Zz
1 2 3 4 5 6 7 8 9 10

EXHIBIT 1

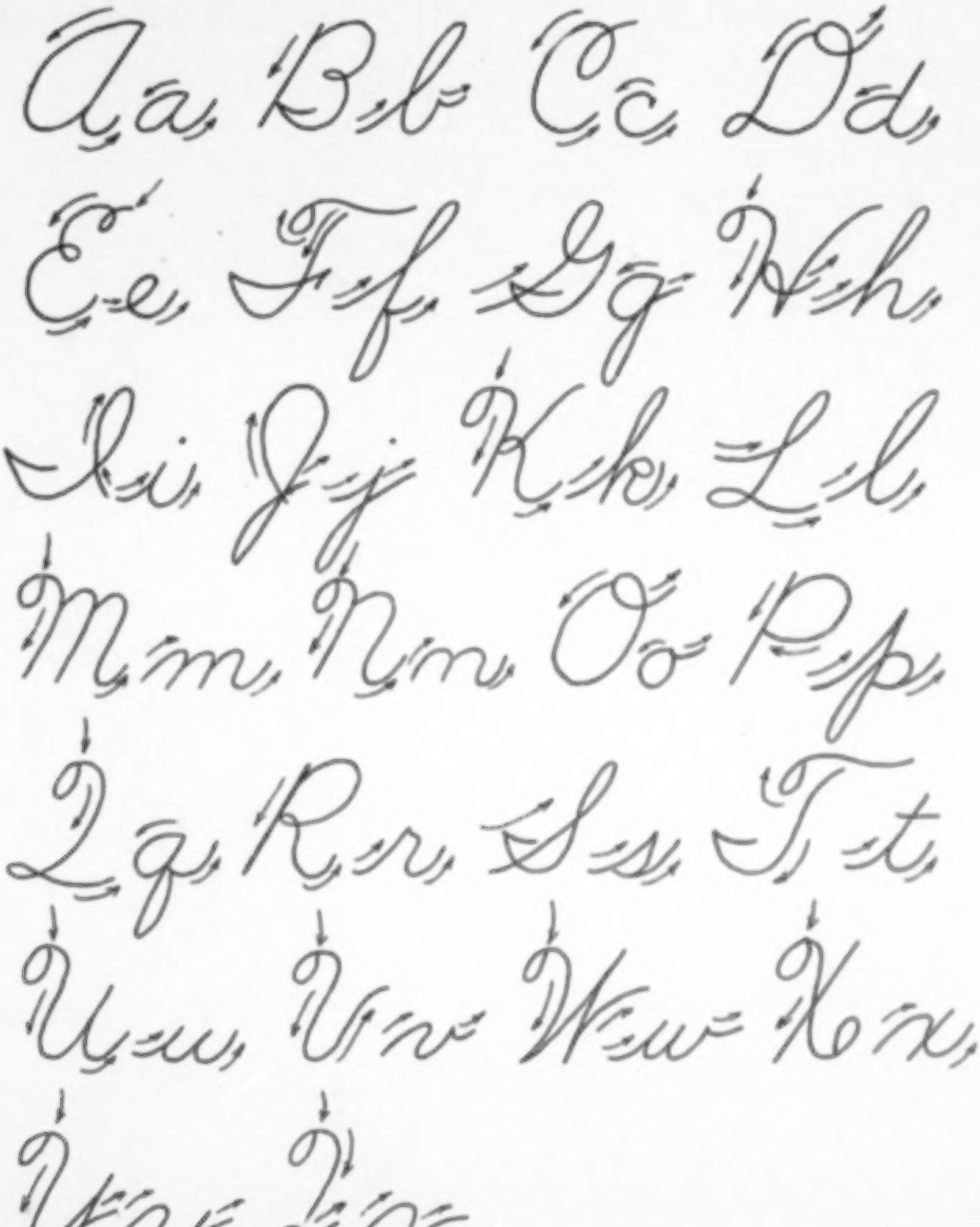

Aa Bb Cc Dd
Ee Ff Gg Hh
Ii Jj Kk Ll
Mm Nn Oo Pp
Qq Rr Ss Tt
Uu Vv Ww Xx
Yy Zz
1 2 3 4 5 6 7 8 9 10

EXHIBIT 2

MANUSCRIPT-CURSIVE

CAPITALS

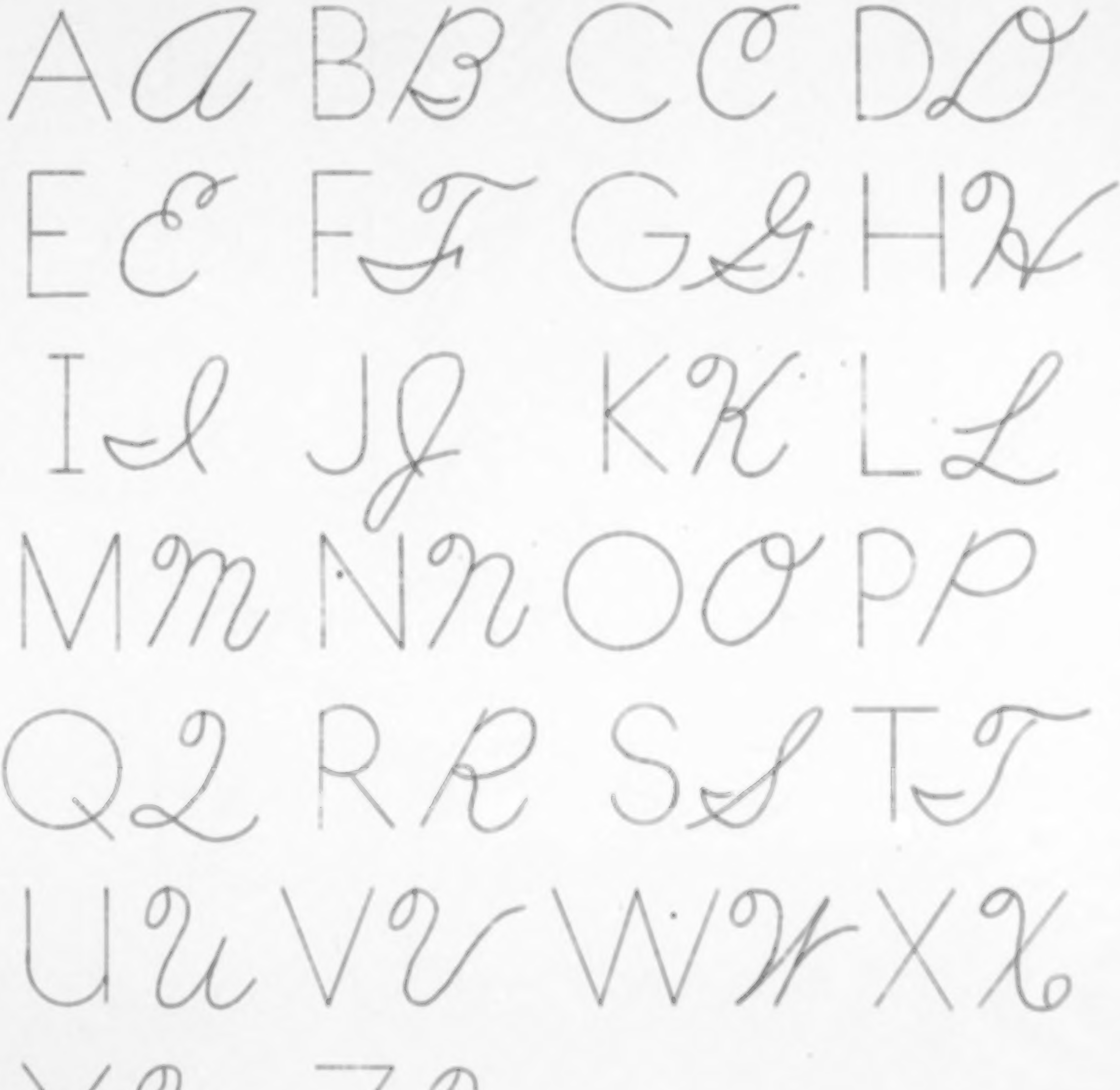

A A B B C C D D
E E F F G G H H
I I J J K K L L
M M N N O O P P
Q Q R R S S T T
U U V V W W X X
Y Y Z Z

EXHIBIT 3

MANUSCRIPT-CURSIVE

Lower Case

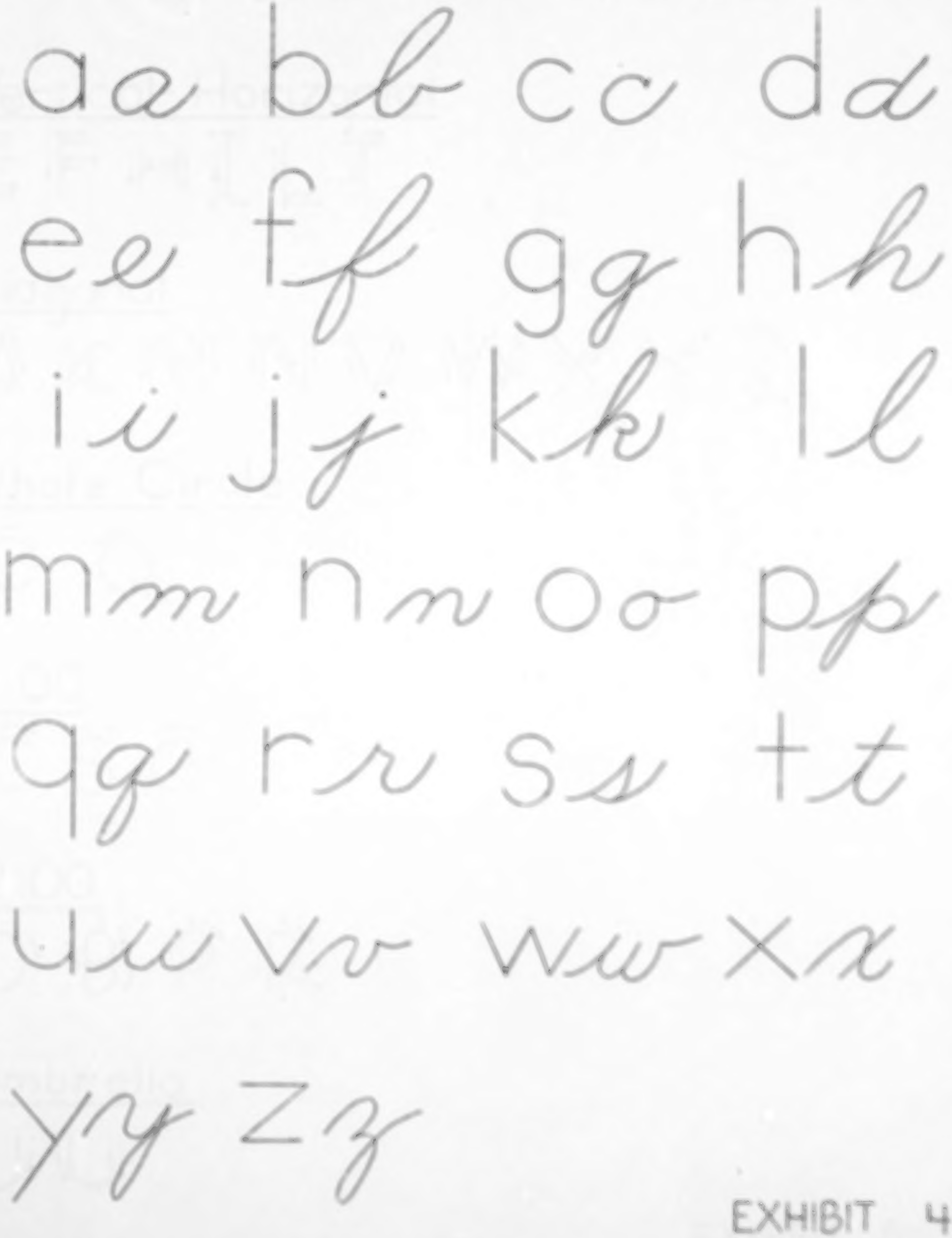
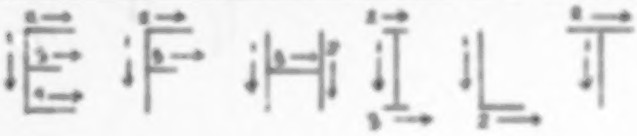

aa bb cc dd
ee ff gg hh
ii jj kk ll
mm nn oo pp
qq rr ss tt
uu vv ww xx
yy zz

EXHIBIT 4

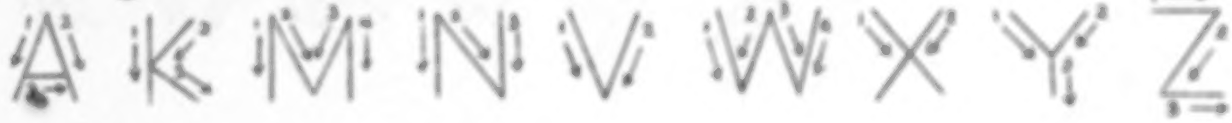
Letter Groupings, Shape c̄ Stroke

MANUSCRIPT - CAPITALS

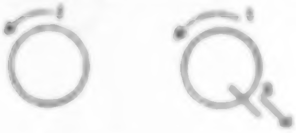
Vertical - Horizontal



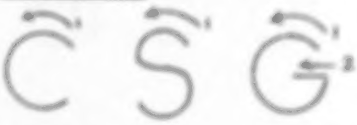
Diagonal



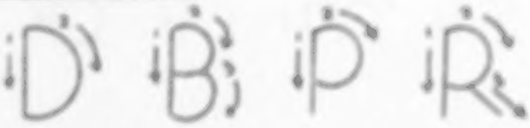
Whole Circle



2:00



12:00



Umbrella

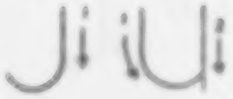


EXHIBIT 5

Letter Groupings, Shape & Stroke

MANUSCRIPT - LOWER CASE

Vertical - Horizontal

i l t

Diagonal

k v w x y z

Whole Circle

o

2:00

a c d e f g q s

10:00

b h m n p r

Umbrella

j u

EXHIBIT 6

Letter Groupings; Shape; Strok

Cursive - Capitals

Upstroke - ( )

S G L

Downcurve - ( )

A O C E

Slanted Downstroke - ( )

B P R

Curved Downstroke - ( ) ( )

T F D

Cane Stroke - ( )

H K M N Q U V W X Y Z

Reverse Loop - ( )

I J

EXHIBIT 7

Letter Groupings, Shape; Stroke

Cursive Lower Case

Upstroke (↗)

i u w t j p r s e l b f k h

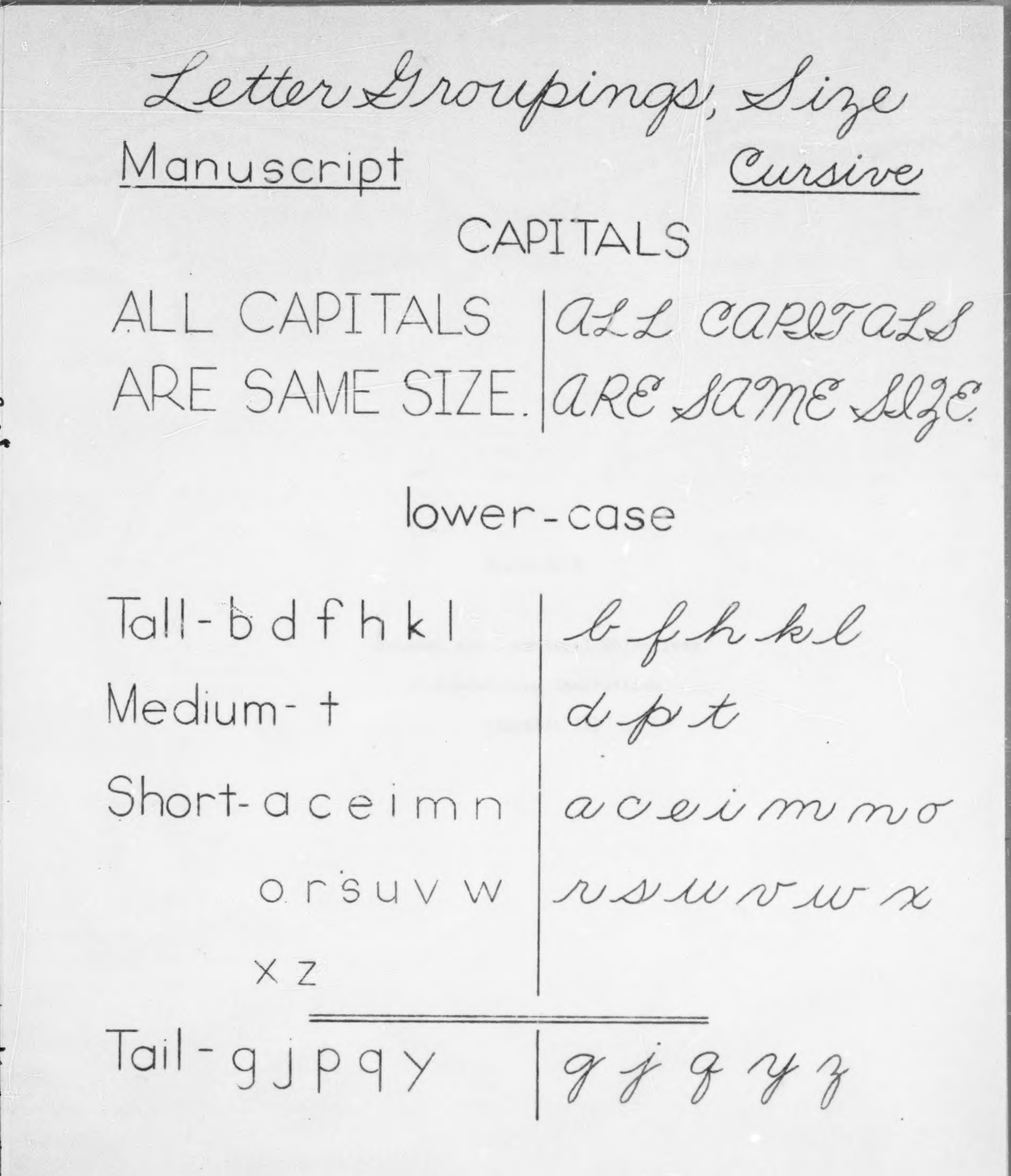
Overcurve (↷)

n m v x y z

Downcurve (↶)

a o c d g q

EXHIBIT 8 3



Letter Groupings; Size

Manuscript	Cursive
CAPITALS	
ALL CAPITALS ARE SAME SIZE.	ALL CAPITALS ARE SAME SIZE.
lower-case	
Tall- b d f h k l	b f h k l
Medium- t	d p t
Short- a c e i m n o r s u v w x z	a c e i m n o r s u v w x
Tail- g j p q y	g j q y z

EXHIBIT 9

Appendix B

General and Behavioral Objectives of Handwriting Instruction

(Exhibit 12)

EXHIBIT 12 A

GENERAL OBJECTIVES OF HANDWRITING INSTRUCTION

1. To instill in children a sense of pride in writing legibly so others may read easily.
2. To develop in each individual the habits and skills which should result in the ability to write legibly and fluently.
3. To maintain a program of sequential development providing for continuity and progression in manuscript and cursive writing.
4. To provide for specific daily instruction lessons in handwriting followed by purposeful drill until a degree of skill and achievement, commensurate with the ability of the individual child, is developed.
5. To develop an understanding of the need for purposeful, systematic practice in handwriting.
6. To corrolate handwriting with activities that are related to the child's experiences where written expression is required.
7. To develop the ability to write automatically, so the mind is free to give attention to the meaning of what is being written rather than the mechanics of handwriting.
8. To develop right habits of posture in order to eliminate fatigue.
9. = To help each child acquire a style of writing which will meet his individual needs as he matures.
10. To encourage self-evaluation and analysis so that each child will realize his own practice needs.
11. To help children acquire habits of organization and neatness in written work.
12. To develop and instill individuality and pride in all written work.

EXHIBIT B

GENERAL OBJECTIVES OF HANDWRITING INSTRUCTION*

UNDERSTANDINGS AND ATTITUDES

1. An understanding of the need for legible handwriting whether it is manuscript or cursive.
2. An understanding of the values of purposeful, systematic practice.
3. An appreciation of the contribution handwriting has to make to mankind.

SKILLS

1. The ability to write clearly and legibly (shape, size, slant, spacing) in either manuscript or cursive form.
2. The ability to write with reasonable speed and ease.
3. The ability to use tools and materials correctly.
4. The ability to evaluate progress for self-improvement.
5. The ability to express one's thoughts legibly in written form without conscious regard to the mechanics of handwriting.

Webster Central School, Penmanship Course of Study. Webster Central School, Webster, New York. 1963. pp. 2-3.

EXHIBIT C

BEHAVIORAL OBJECTIVES OF HANDWRITING INSTRUCTION

READINESS LEVEL

The learner will:

1. Identify differences in letter forms and in words written in manuscript style.
2. Voluntarily attempt to copy letters and words (from blocks, charts, chalkboard, books, etc.)
3. Write his name in manuscript style.
4. Draw circles which are round and straight lines which are vertical, horizontal and diagonal.
5. Participate in group dictation in order to foster an interest in writing and an awareness of the need for writing as a means of communication.
6. Exercise eye and hand muscles through participation in activities involving pasting, cutting, modelling, painting, drawing, block building and the like.

EXHIBIT C

Behavioral Objectives
Cont'd.

LEVEL ONE

The learner will:

1. Given a model form for each manuscript capital and lower-case letter, write the capital and lower case manuscript letters according to this model form.
2. Given a model form for each manuscript numeral from 0 to 9, write these numerals according to this model form.
3. Write manuscript letters using proper alignment - where each letter rests on the base line of the writing space.
4. Write letters and words using proper spacing - the space of one finger is left between words and the spacing between letters is controlled by the shape of the letters.
5. Assume correct writing position at the chalkboard - body is balanced and writing is at eye level.
6. Assume correct manuscript writing position at the desk - feet flat on floor; paper position straight rather than slanted; pencil held lightly between thumb and first finger, etc.
7. Participate in group dictation.
8. Write simple sentences and stories using correct letter formation, size, spacing, slant, and alignment.
9. Evaluate and diagnose errors in his writing in terms of manuscript letter shape, size, spacing, slant, and alignment.

EXHIBIT C
Behavioral Objectives
Cont'd.

LEVEL TWO

The learner will:

1. Without the use of model alphabet cards or charts, write the manuscript capital and lower-case letters and numerals using correct letter shape, size, slant, spacing and alignment.
2. Write the manuscript letters and numerals with reasonable speed - 20-30 words per minute.
3. Identify the following punctuation terms and use them correctly in writing: capital letter, period, comma, question mark.
4. Given a format for organizing writing on a page, use this format correctly in those activities which involve written expression (margins, headings, etc.).
5. Control the writing instrument to the degree that he can write with a flowing movement rather than in jerks and stops.
6. Write simple stories and paragraphs without requiring help with each sentence or becoming overly tired.
7. Recognize a few words written in cursive style.
8. Voluntarily attempt to write letters and words in cursive style.
9. Listen attentively and watch the teacher's movements for about the time it takes to write a three or four letter word.

EXHIBIT C
Behavioral Objectives
Cont'd.

LEVEL THREE

The learner will:

1. Given a model form for each cursive capital and lower-case letter, write the capital and lower-case cursive letters according to this model form.
2. Given a model form for each cursive numeral from 0 to 9, write these numerals according to the model form.
3. Write cursive letters using proper alignment - where each letter rests on the base line.
4. Joins the letters in words written in cursive style.
5. Writes letters with uniform and parallel slant.
6. Writes letters and words using proper spacing - spacing between letters is about the width of a lower-case "c" and between words the width of a capital "C".
7. Assume correct writing position at the chalkboard.
8. Assume correct cursive writing position at the desk - paper is slanted to maintain letter slant; writing instruments held properly; posture erect with feet flat on floor, etc.
9. Evaluate his handwriting and diagnose errors in terms of cursive letter shape, size, slant, and alignment.
10. Write the cursive letters and numerals with reasonable speed - 30-40 letters per minute.
11. Use cursive writing in those functional activities which involve written communication and self-expression.
12. Maintain the ability to write in manuscript style through involvement in activities which require manuscript writing.

EXHIBIT C
Behavioral Objectives
Cont'd.

LEVEL FOUR

The learner will:

1. Without the use of model alphabet charts or cards, write the cursive capital and lower-case letters and numerals using correct letter shape, size, slant, spacing and sentence alignment.
2. Reduce the size of his writing to accomodate a writing space 3/8 of an inch in height.
3. Write the cursive letters and numerals with increasing speec - 40-50 letters per minute.
4. Given opportunities to write for different purposes, vary his handwriting speed according to these purposes.
5. Habitually assume correct writing position at chalkboard and desk.
6. Use a variety of writing instruments to meet different handwriting needs.
7. Evaluate his writing and diagnose errors in terms of better shape, size, slant, spacing and alignment.
8. Use manuscript writing as a supplementary writing tool.

EXHIBIT C
Behavioral Objectives
Cont'd.

LEVEL FIVE

The learner will:

1. Write the letters and numerals of the cursive alphabet with ease, devting major attention to the content of writing rather than the elements of legibility.

2. Write the letters and numerals of the cursive alphabet using correct letter shape, size, slant, spacing and alignment.

3. Detect and correct individual writing errors.

4. Habitually assume correct writing position at chalkboard and desk.

5. Write the cursive letters and numerals at about 50-60 symbols per minute, but varies the speed according to the writing purposes.

6. Write with an individual style which is legible, fluent, and sufficiently rapid to meet his handwriting needs.

Appendix C

Initial

Course Outline

The Teaching of Handwriting

COURSE OUTLINE

THE TEACHING OF HANDWRITING

JUNE, 1964

I. INTRODUCTION TO THE PROGRAM

- A. Rationale of programmed instruction
- B. How to use a program
- C. Purposes of this program in teaching handwriting.

II. GENERAL CONSIDERATIONS IN TEACHING HANDWRITING

- A. Purposes of handwriting
- B. Behavioral objectives of handwriting instruction
- C. Characteristics of the learner
- D. Readiness for handwriting instruction
- E. Role of motivation in handwriting instruction
- F. Writing in the functional school program
- G. Developmental nature of handwriting instructional sequences
- H. Individualization of instruction

III. THE MANUSCRIPT ALPHABET

- A. Manuscript as an initial style of writing
- B. Maintenance of handwriting beyond primary grades
- C. The manuscript alphabet - letter shape, slant and size
- D. The manuscript alphabet - slant, spacing and sentence alignment
- E. Instruction in manuscript writing
    1. Introduction of letters
        - a. Whole word approach
        - b. Initial strokes
        - c. Functional nature of approach
    2. Readiness activities in initial instruction
    3. Chalkboard writing in instruction
    4. Position for manuscript writing
    5. The clock as an instructional aid
    6. Techniques of self-evaluation
    7. Length of handwriting periods
    8. Instructional materials and how to use them

IV. THE CURSIVE ALPHABET IN THE TRANSITION TO CURSIVE WRITING

A. General considerations in the transition

1. Rationale for the transition
2. Readiness for making the transition
3. Time factors in the transition
4. Individualization of instruction
5. Children with special problems
6. Gradual nature of the transition

B. The cursive alphabet - letter shape, size, and form

C. The cursive alphabet - slant, spacing, sentence alignment

D. Instruction in cursive writing

1. Introduction of letters
2. a. Similarities to and differences from manuscript
   b. Initial stroke
   c. Whole word approach
   d. Functional nature of approach
2. Chalkboard writing in instruction
3. Transitional steps involved in instruction
4. Position for cursive writing
5. Techniques for self-evaluation
6. Instructional materials and how to use them

V. DIAGNOSING DIFFICULTIES AND PROVIDING REMEDIATION

A. Diagnosis in terms of letter shape, size, stroke, slant, spacing, sentence alignment

B. Provision of samples and models to use in correction

C. Evaluation scales and diagnostic charts

D. Functional writing as motivation

E. Provision of remedial activities

1. Intensive work with "handwriting demons"
2. Use of audio-visual materials
3. Development of teacher made exercises
4. Use of special materials and techniques: Tracing, copying, rhythm, exercises and drills, manual guidance, chalkboard writing

VI. THE LEFT-HANDED CHILD

A. Writing style to be utilized

B. Body position

C. Use of equipment

D. Special seating arrangements

E. Special equipment

Appendix D

First Revision of

Course Outline

The Teaching of Handwriting

COURSE OUTLINE

THE TEACHING OF HANDWRITING

NOVEMBER, 1964

PREFACE

A. Definition of manuscript and cursive writing
B. Dual nature of the handwriting program in the elementary school
C. Brief background of handwriting instruction in America
D. Handwriting and communication
E. Intent of book - programmed instructional sequence in teaching of handwriting
F. The utilization of this program

UNIT I. HANDWRITING AND COMMUNICATION

A. Development of writing as means of communication
B. Purposes of handwriting
C. Purposes of instruction in handwriting
D. Functional nature of handwriting instructional program in the elementary school

UNIT II. OUR ALPHABET SYSTEMS

SET I. FROM SOUND TO SYMBOL

A. From pictographs to words to written symbols
B. Linguistic groupings of language
C. Alphabetic languages
D. Illegibilities and role of handwriting

SET II. THE MANUSCRIPT AND CURSIVE ALPHABETS - HISTORICAL BACKGROUND

SET III. THE MANUSCRIPT AND CURSIVE ALPHABET - A COMPARISON

A. Basic differences: Joining, slant, strokes
B. Basic similarities: Size, shape

SET IV. THE MANUSCRIPT ALPHABET - ALIGNMENT, SHAPE, SLANT

SET V. THE MANUSCRIPT ALPHABET - SIZE, SPACING

SET VI. THE CURSIVE ALPHABET - ALIGNMENT, SHAPE, SLANT

SET VII. THE CURSIVE ALPHABET - SIZE, SPACING

SET VIII. NUMERALS - MANUSCRIPT AND CURSIVE

UNIT III. DEVELOPMENT OF INSTRUCTIONAL SEQUENCES IN MANUSCRIPT AND CURSIVE HANDWRITING

A. Behavioral Objectives
B. Individual differences and readiness
C. Methods
D. Materials
E. Activities
F. Evaluation

UNIT IV. DIAGNOSIS AND REMEDIATION

A. In terms of elements of legibility
B. Diagnostic charts
C. Provision of remedial activities
D. The left-handed child

Appendix E

Final Revision of
Course Outline
The Teaching of Handwriting

COURSE OUTLINE

THE TEACHING OF HANDWRITING

JANUARY, 1965

PREFACE

(Same as previous Course Outline--Nov., 1964)

UNIT I GENERAL CONSIDERATIONS IN THE TEACHING OF HANDWRITING

SET I. HANDWRITING AND COMMUNICATION
(Same as previous Unit I--Nov., 1964)

SET II. HISTORICAL DEVELOPMENT OF MANUSCRIPT AND CURSIVE WRITING STYLES
(Same as Unit II, Set II--Nov., 1964)

SET III. COMPARISON OF MANUSCRIPT AND CURSIVE WRITING STYLES
(Same as previous Unit II, Set III--Nov., 1964)

UNIT II THE MANUSCRIPT ALPHABET - ELEMENTS OF LEGIBILITY

A. Sentence alignment
B. Shape of letters
C. Slant of letters
D. Size of letters
E. Spacing of letters and words
F. Grouping of letters for instruction

UNIT III THE CURSIVE ALPHABET: NUMERALS - ELEMENTS OF LEGIBILITY

A. through F--Same as Unit II
G. Shape of Numerals (Manuscript and cursive)
H. Slant of numerals (Manuscript and cursive)
I. Size of numerals (Manuscript and cursive)
J. Spacing of numerals (Manuscript and cursive)
K. Grouping of numerals for instruction

UNIT IV THE DEVELOPMENT OF INSTRUCTIONAL SEQUENCES IN MANUSCRIPT AND CURSIVE WRITING

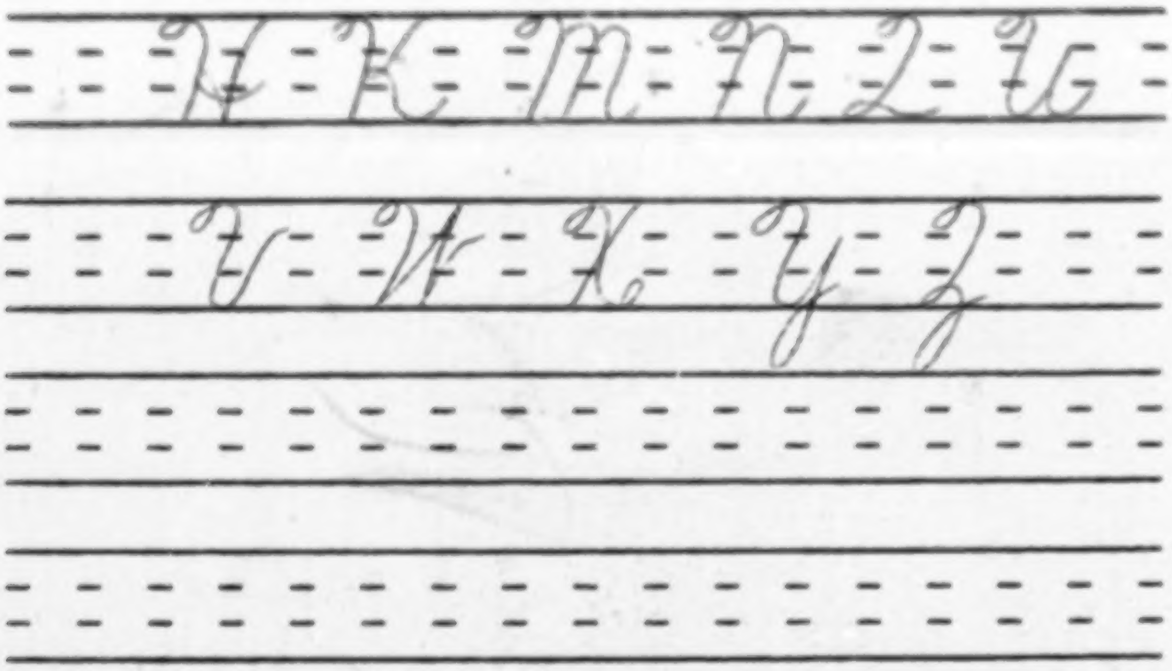
A. Programming approach to developing instructional sequences
B. Description of the learner
C. Preparation of objectives
D. Selection of methods, activities, and materials
E. Position and writing instruments
F. Readiness
G. Evaluation
H. Diagnosis and Remediation

Appendix F

Programmed Item With Carbon

(Item No. 3.1.45)

3.1.45 (carbon)


H K M N Q U
V W X Y Z

3.1.45

Write the cursive letters which begin with a CANE STROKE.

CAPITALS:

Appendix G

Programmed Items
Which Teach the Mnemonic
PAPER

4.5.22

An effective lesson in handwriting, which allows for the development of both visualization and recall, includes these five steps:

Purposes--the setting of . . . .

Analysis--of elements of legibility

Practice--both specific and purposeful

Evaluation--in terms of elements of legibility

Revision--toward a higher level of proficiency

Notice that the first letters of each of these words spells the word ________________. This is not an accident. A mnemonic device (one that aids in recall) such as this may help you remember these five steps more easily, and it is very important that you remember and use these five steps in your handwriting lessons--and in this order!

4.5.23

We have noted previously that learning to write is most effective when children are motivated, and that motivation involves the clear understanding of the goals or p ______________ of each lesson. Therefore, the first step in each lesson is the setting of ________________.

P = Purposes

4.5.24

When the teacher and the class decide to devote the day's instructional period in handwriting to an examination of the factors involved in the correct spacing of manuscript letters and words, they are setting the ____________________ of the lesson.

4.5.25

Once the purposes have been set, the child must be helped to ANALYZE the content of the lesson in terms of these purposes.

Let's suppose a lesson may be concerned with teaching the 2:00 to 4:00 letters. The details of these letters--the strokes of which they are composed, their size, other letters to which they are similar--should be determined by the child as he a________________ the letters in terms of their elements of legibility.

We can consider ______________________ the second step in a handwriting lesson.

P - Purpose

A - Analysis

4.5.26

Recall--the ability to call to mind letter images sufficiently well to be able to write them correctly--is developed not only through careful analysis of letter form, but also through specific and purposeful PRACTICE in writing the letters using proper shape, size, slant, spacing and alignment. Activities which involve both copying of model forms and using these letter forms in functional writing situations are essential in providing specific and purposeful

______________________________.

P - *Purpose*

A - *Analysis*

P - *Practice*

4.5.27

The next step in the lesson is the provision of additional learning experiences which allow the child to EVALUATE his writing in terms of the elements of legibility. Using a model or handwriting scale as the evaluative device, the child can be encouraged to diagnose his handwriting errors and measure his writing progress through this fourth step,

e_____________________________.

P - Purpose
A - Analysis
P - Practice
E - Evaluation

4.5.28

Once the child has determined those elements of legibility which require correction, he must be given an opportunity to DO those things in which he needs further practice. Provision for correction and REVISION is doubly essential because it gives the child a chance to perform the task correctly and it gives the teacher an opportunity to reinforce the correct response. The final step in the lesson, ____________________, should never be "put off until tomorrow because we have run out of time today."

P - *Purposes*
A - *Analysis*
P - *Practice*
E - *Evaluation*
R - *Revision*

4.5.29

An effective lesson in handwriting, then, should include these five steps:

P 1. The setting of ______________________.

A 2. ______________________ of the content of the lesson in terms of the elements of legibility.

P 3. ______________________, both direct and as part of functional writing situations.

E 4. ______________________ through comparison with a model.

R 5. ______________________ of written materials in terms of elements of legibility.

4.5.30

Now list the five steps involved in teaching a lesson in handwriting.

1.
2.
3.
4.
5.

Appendix H

Table of Contents

For

The Teaching of Handwriting

TABLE OF CONTENTS

Preface i

Inventory of Exhibits x

UNIT I

GENERAL CONSIDERATIONS IN THE TEACHING OF HANDWRITING

Set 1 - Handwriting and Communication . . . . . . 2 (40 items)*

Set 2 - The Manuscript and Cursive Alphabets - Historical Backgrounds . . . . 46 (40 items)

Set 3 - The Manuscript and Cursive Alphabets - A Comparison . . . . 89 (41 items)

Total: 121 items

UNIT II

THE MANUSCRIPT ALPHABET

Set 1 - Shape, Slant and Alignment . . . . 132 (60 items)

Set 2 - Size and Spacing . . . . 198 (30 items)

Total: 90 items

*This column presents the total number of items in each set and unit.

UNIT III

THE CURSIVE ALPHABET

Set 1 - Shape, Slant and Alignment	232	(50 items)
Set 2 - Size and Spacing	285	(20 items)
Set 3 - Numerals, Manuscript and Cursive	309	(30 items)
	Total:	100 items

UNIT IV

DEVELOPING INSTRUCTIONAL SEQUENCES

Set 1 - Description of the Learner	347	(35 items)
Set 2 - Preparation of Objectives	384	(25 items)
Set 3 - Selection of Methods, Activities and Materials - Readiness for Initial Instruction in Handwriting	410	(30 items)
Set 4 - Selection of Methods, Activities and Materials - Position and Movement in Handwriting	442	(30 items)
Set 5 - Selection of Methods, Activities and Materials - Manuscript Writing	472	(50 items)
Set 6 - Selection of Methods, Activities and Materials - Cursive Writing	523	(45 items)
Set 7 - Evaluation of Instruction	569	(20 items)
Set 8 - In Conclusion	592	(20 items)
	Total:	255 items

Appendix I

Two-Way Chart of Program Content and Instructional Aims Used in the Construction of the Objective Achievement Test

Appendix I

Two-way Chart of Program Content and Instructional Aims

Used in the Construction of the Program

	Instructional Objectives						
	1	2	3	4	5	6	Total
Content	Produce Model Manuscript & Cursive Letters	Provide Instructional Sequences	Present the Alphabets	Prepare Handwriting Objectives	Select Appropriate Methods, Activities, Materials	Diagnose Difficulties	Total
Handwriting and Communication		2					2
History of Handwriting	2	5					7
Comparison of Manuscript and Cursive Forms	6		1				7
Elements of Legibility	5						5
Manuscript Letter and Number Forms	5		8				13
Cursive Letter and Number Forms	4		4				8
Transition from Manuscript to Cursive		2	6		7		15
Programming Approach to Instruction		6					6
Developmental Characteristics		2		1	4		7
Instructional Emphases				5			5
Readiness		3	1				4

(Chart continued on next page)

Appendix I (continued)

Two-way Chart of Program Content and Instructional Aims

Used in the Construction of the Program

	Instructional Objectives						
	1	2	3	4	5	6	Total
Content	Produce Model Manuscript & Cursive Letters	Provide Instructional Sequences	Present the Alphabets	Prepare Handwriting Objectives	Select Appropriate Methods Activities, Materials	Diagnose Difficulties	Total
Position and Movement					3		3
Use of Clock for Instruction			5				5
Purposeful Approach					2		2
Writing Spaces			2		2		4
Teaching Time		1					1
Steps in Teaching a Handwriting Lesson					10		10
Handwriting Activities					2		2
Left-handed Child					1		1
Handwriting Scales						1	1
Illegibilities						1	1
Remediation						1	1
	22	21	27	6	31	3	110

Appendix J

Field Test Version
# of the
Objective Achievement Test

NAME: ______________________________

DATE: ______________________________

CLASSIFICATION: ______________________________

SECTION: ______________________________

THE TEACHING OF HANDWRITING

COMPLETION

Directions: Complete each of the following sentences by filling in the appropriate word or words.

53. The Purposeful Approach to teaching handwriting involves the use of ____________________ ____________________ to teaching new letters.

54. In cursive writing, the paper should be held in such a way that the edge of the paper makes about a ______________ degree angle with the edge of the desk.

55. At the Readiness Level, the child should learn both the form and the ______________ of manuscript strokes.

56. The most common cursive letter stroke is the ____________.

57, 58. The major similarities between manuscript and cursive writing are concerned with letter ______________ and ______________.

59, 60. The major instructional emphases in handwriting should be on the development of ________________ and ________________.

61. Cursive numerals are the same size as cursive ______________ letters.

62, 63. Grouping letters by similarity of stroke assists in developing two important handwriting abilities: ____________________ and ____________________.

64. In manuscript, spacing is controlled by letters ____________.

65, 66. In the middle grades, the writing space should be about _________ of an inch in height and the size of the short letters should be about __________ the height of the writing space.

67, 68. The handwriting teacher needs to be MOST concerned about the child's ________________ development and LEAST concerned about the child's ________________ development.

69. Counting devices help the teacher develop ________________ in handwriting.

70-73. The four points on the clock face which are used most often in teaching manuscript writing are:

______:00

______:00

______:00

______:00

74, Communication requires a ____________________, a ____________
75. of communication, and a ____________________.

76, Two strokes which were added to half-uncials were called
77. ____________________ and ____________________.

78. Instructional objectives in handwriting should be written
in such a way that they include the __________________________
for desirable performance.

79, The two letters which are basically different in print form
80. and manuscript form are ________________ and ________________.

81, The cursive forms of those manuscript letters which start
82. at the ______:00 position on the clock and end at the
______:00 position on the clock should be introduced very
early in the transition.

83. When the teacher "talks" the strokes as she writes them, she
is helping the child increase his ability to ________________.

84. The "National American Hand" developed in America during the
19th century was called ________________________ writing.

85- In manuscript, the downstroke is always ____________________
87. and parallel. In cursive, the downstroke is always
___________________ and parallel. This accounts for the
difference between manuscript and cursive writing in
letter ________________________.

88- If a teacher wishes to adjust instruction to the learner's
90. individual growth patterns, she must be prepared to describe
the learner in terms of his _______________, _______________,
and ___________________ development.

91. The copper-plate writing which was reproduced in copy-books
during the 17th and 18th centuries was known as the English
________________________ Hand.

92- 10:00 letters always contain a ____________________ which is
96. always written ____________________. 2:00 letters sometimes
contain a ________________ which is always written
___________________. Confusion is prevented if the
___________________ in which the strokes are made is
emphasized in instruction.

97-
101. **List the FIVE steps involved in the Programming Approach to the development of instructional sequences in handwriting.**

97.

98.

99.

100.

101.

102-
106. **List the ELEMENTS OF LEGIBILITY with which the teacher must be concerned in teaching handwriting.**

102.

103.

104.

105.

106.

107-
111. **List the FIVE instructional steps involved in a handwriting lesson.**

107.

108.

109.

110.

111.

112-
116. **List the FIVE transitional steps involved in introducing a cursive letter or group of letters (such as *l*, *i*, and *t*, during the transition from manuscript to cursive.**

112.

113.

114.

115.

116.

MULTIPLE CHOICE

DIRECTIONS: SELECT THE APPROPRIATE RESPONSE FOR EACH QUESTION. BLACKEN IN THE CORRESPONDING SPACE ON THE SEPARATE ANSWER SHEET AS YOU HAVE BEEN INSTRUCTED. DO NOT MARK ON THIS BOOKLET.

1. The major differences between manuscript and cursive writing are concerned with letter:
   1. slant, size, and strokes.
   2. slant, joining, and strokes.
   3. slant, joining, and shape.
   4. (1) and (2)
   5. (2) and (3)

2. The handwriting teacher should be LEAST concerned with the child's:
   1. current level of social and emotional development.
   2. current level of intellectual development.
   3. typical growth patterns in terms of chronological age.
   4. all of the above.
   5. none of the above.

3. Manuscript letters are composed of how many basic strokes?
   1. 1
   2. 2
   3. 3
   4. 4
   5. 5

4. The manuscript and cursive forms of the numeral 7 are different in:
   1. size
   2. slant
   3. number of strokes.
   4. (1) and (3)
   5. all of the above.

5. One indication of a child's readiness for formal initial instruction in manuscript writing is his ability to:
   1. organize his writing on an unlined sheet of paper.
   2. identify differences in letter forms and in words written in manuscript styles.
   3. control the writing instrument to the degree that he can write with a flowing hand rather than in jerks or stops.
   4. listen attentively and watch the teacher's movements for about the time it takes to write a three or four letter word.
   5. all of the above.

6. At the first instructional level (about first grade) the writing lines in a writing space should be how far apart?

   1. two inches
   2. one and one-half inches
   3. one inch
   4. three fourths of an inch
   5. one-half inch

7. There are how many cursive MEDIUM letters?

   1. 1
   2. 2
   3. 3
   4. 4
   5. 5

8. At the desk, the child writing in manuscript style should:

   1. rest both forearms and elbows on the desk.
   2. rest both forearms on the desk with elbows slightly off the desk.
   3. rest both forearms on the desk, but rest on the desk only the elbow of the hand holding the writing instrument.
   4. be concerned only with the position of the hand holding the writing instrument.
   5. none of the above.

9. The Ayres Scale is used for:

   1. evaluating the general legibility of manuscript writing.
   2. evaluating the general legibility of cursive writing.
   3. evaluating the specific elements of legibility in manuscript.
   4. evaluating specific elements of legibility in cursive.
   5. diagnosing problems in legibility in both manuscript and cursive.

10. The forerunners of today's manuscript and cursive writing styles may be found in the writing of the early:

    1. Arabs.
    2. Romans.
    3. Greeks.
    4. Egyptians.
    5. Phoenicians.

11. A child who is ready for the transition to cursive writing should demonstrate the ability to:

    1. recognize all cursive letters and read cursive writing as well as he reads regular print.
    2. without the use of model alphabet charts or cards, write all of the manuscript letters correctly.
    3. write the manuscript letters and numerals at about 40 letters per minute.
    4. (1) and (2)
    5. (2) and (3)

12. In initial instruction in manuscript, the child should learn to hold the pencil:

    1. slightly above the point.
    2. about an inch and a half from the point.
    3. at the point where the paint begins.
    4. at any place where he can get a comfortable grip.
    5. none of the above.

13. Which of the following activities or techniques should be used in handwriting instruction?

    1. copying.
    2. tracing.
    3. exercises and drills.
    4. (1) and (2).
    5. all of the above.

14. Cursive lower-case short letters are:

    1. 1/2 the size of tall letters.
    2. 1/4 the size of tall letters.
    3. 1/3 the size of tall letters.
    4. 3/8 the size of tall letters.
    5. none of the above.

15. The four cursive letters which cause about 45% of the illegibilities in the cursive writing of elementary school children are:

    1. b, u, e, l
    2. r, a, t, e
    3. f, o, t, m
    4. d, e, m, h
    5. t, a, b, l

16. The four points on the clock face used most often in teaching handwriting are:

    1. 2:00, 3:00, 6:00, 9:00.
    2. 2:00, 4:00, 8:00, 10:00.
    3. 2:00, 4:00, 8:00, 12:00.
    4. 3:00, 6:00, 9:00, 12:00.
    5. 6:00, 8:00, 10:00, 12:00.

17. At the Readiness Level (prior to formal instruction in handwriting) children should be taught:

    1. the specific direction of each of the manuscript strokes.
    2. to write on paper lined with one and one-half inch lines.
    3. to identify specific differences in manuscript letter forms.
    4. (1) and (3)
    5. all of the above.

18. In the transition to cursive writing, letters should be grouped for introduction according to:

    1. common letter strokes - i.e., loops: l, b, k
    2. beginning letter strokes - i.e., upstroke: p, t, w
    3. ending letter strokes - i.e., overcurve: v, x, y
    4. all of the above.
    5. none of the above.

19. During the transition to cursive writing, adjustments for left-handed children should be concerned with which of the following positions:

    1. position in which the writing paper is held.
    2. position in which the palm and wrist are held.
    3. position in which the writing instrument is held.
    4. (1) and (2)
    5. (1) and (3)

20. The development of small letters with distinctive shapes of their own took place during the era of:

    1. Julius Caesar
    2. Alexander the Great
    3. Henry the Eighth
    4. Charlemagne
    5. Louis the Fourteenth

21. In the Programming Approach to the development of instructional sequences in handwriting, after selecting appropriate subject matter the next step involves:

    1. evaluating prior instruction.
    2. describing the learners.
    3. selecting appropriate instructional methods and materials.
    4. pretesting the subject matter in terms of elements of legibility.
    5. analyzing the subject matter in terms of elements of legibility.

22. During the primary grades, approximately how many minutes of formal instruction in handwriting should be provided each week?

    1. 30 minutes.
    2. 60 minutes.
    3. 75 minutes.
    4. 120 minutes.
    5. 200 minutes.

23. Research evidence indicates that:

    1. readiness for initial instruction in handwriting is strongly influenced by how well the child can read.
    2. handwriting instruction is most effective if it is postponed until the child is emotionally, socially, and intellectually ready.
    3. the higher the individual goals of handwriting instruction are set for each child, the more likely it is the child will try to reach these goals.
    4. a child will learn the handwriting skill only when he is motivated to learn - to produce the desired behavior.
    5. The child's current stage of physical development is the only really essential information the handwriting teacher must have.

24. Cursive numerals are the same size as which cursive letter?

1. i
2. t
3. b
4. o
5. none of the above.

25. In teaching manuscript, which of the following letters should NOT be grouped for instruction:

1. M, A, N
2. i, l, t
3. a, c, g
4. d, b, p
5. U, u, j

26. In which of the following ways does the ideal corrective handwriting program take place?

1. helping individually those retarded one or more years in handwriting.
2. daily work whenever a child appears to have missed a needed skill.
3. organizing special groups to help those who have become about equally retarded.
4. helping those retarded at the end of an instructional sequence to catch up before moving on to the next instructional sequence.
5. weekly evaluative sessions involving the use of standardized and teacher made evaluative charts with specialized individual help being offered at this time.

27. After the transition, manuscript should be:

1. avoided as much as possible.
2. used interchangeably with cursive.
3. excluded as a writing style.
4. maintained but used only for special art activities which require printing.
5. maintained and used in place of cursive in any appropriate writing activities.

28. Encouraging the child to proofread his written work using handwriting symbols is:

1. desirable at all grade levels.
2. not begun until the middle grades.
3. of decreasing importance as the child progresses through school.
4. desirable because it fosters attention to neatness and uniformity of style.
5. essential to the continuing development of reasonable speed.

29. The first writing style which was reproduced in copy-books during the 17th and 18th centuries was known as the:

    1. Caroline Hand.
    2. Humanist Hand.
    3. Spencerian Hand.
    4. English Round Hand.
    5. Cursive Chancery Hand.

30. The transition to cursive writing is currently made because:

    1. cursive writing is faster and the child will need to use this style in his adult writing activities.
    2. a signature written in manuscript is not legal and is therefore not acceptable on checks or legal documents.
    3. considerable social pressure to teach cursive is applied to the schools by parents and members of the community.
    4. all of the above.
    5. none of the above.

31. The manuscript and cursive forms of the letter d are basically different in:

    1. size.
    2. shape.
    3. slant.
    4. (1) and (2).
    5. (1) and (3).

32. In cursive writing the left-handed child should be taught to place his paper in such a way that:

    1. the paper slants to the left.
    2. the paper slants to the right.
    3. the writing lines are vertical rather than horizontal.
    4. either (1) or (2)
    5. either (2) or (3)

33. There are how many manuscript MEDIUM letters?

    1. 1
    2. 2
    3. 3
    4. 4
    5. 5

34. The major instructional emphases in handwriting should be on both the development of legibility and:
    1. speed.
    2. fluency.
    3. uniformity of style.
    4. (1) and (2)
    5. (2) and (3)

35. During the transition, adjustments for right-handed children should be concerned with which of the following positions?

   1. position in which the writing paper is held.
   2. position in which the palm and wrist are held.
   3. position in which the writing instrument is held.
   4. (1) and (2)
   5. (2) and (3)

36. Which of the following instructional objectives in handwriting would you consider to be most behavioral?

   1. to help each learner acquire a style of writing which will meet his individual needs as he matures.
   2. to develop in each learner the ability to write clearly and legibly in either manuscript or cursive style.
   3. at the Readiness Level, the learner will draw circles which are round, and straight lines which are vertical, horizontal, and diagonal.
   4. all of the above.
   5. none of the above.

37. Manuscript numerals are the same size as:

   1. P
   2. a
   3. b
   4. (1) and (2)
   5. (1) and (3)

38. During the middle grades, the writing lines in a writing space should be about how far apart?

   1. 1 inch
   2. 3/4 inch.
   3. 1/2 inch
   4. 3/8 inch
   5. 1/4 inch

39. In introducing a new group of letters during the transition to cursive writing, the SECOND instructional step involves:

   1. writing the letter in slanted manuscript.
   2. writing the letter in unjoined cursive.
   3. joining each of the manuscript letter strokes and letters with dotted connecting lines.
   4. joining each of the cursive letter strokes and letters with dotted connecting lines.
   5. tracing the dotted connecting lines between the strokes and letters to emphasize joining.

40. Of all the developmental characteristics typical of children in the first grade, knowledge concerning the physical characteristics is:

    1. least important to the teacher because each child is unique and should not be classified according to physical characteristics.
    2. least important to the teacher because the physical characteristics of young children change so rapidly that the teacher cannot use this information for long-range planning.
    3. most important to the teacher because the child's physical characteristics generally determine the degree to which emotional and social growth will take place.
    4. most important to the teacher because children tend to go through the stages of physical development at about the same time and the teacher can therefore use this information in long-range planning.
    5. none of the above.

41. The cursive forms of which two groups of manuscript letters should be taught first in the transition to cursive writing?

    1. vertical-horizontal and diagonal letters.
    2. vertical-horizontal and 2:00 to 4:00 letters.
    3. vertical-horizontal and 10:00 to 8:00 letters.
    4. diagonal and whole-circle letters.
    5. diagonal and 10:00 to 8:00 letters.

Select the FIVE steps which are appropriate in teaching a handwriting lesson and place a check alongside the 5 you have chosen. Then blacken in the 1st space on the answer sheet corresponding to these 5 numbers.

_____42. Select meaningful words.

_____43. Select appropriate materials.

_____44. Set purposes.

_____45. Reorganize content.

_____46. Pretest content in terms of elements of legibility.

_____47. Revise or correct writing.

_____48. Select appropriate content.

_____49. Posttest content in terms of elements of legibility.

_____50. Evaluate writing.

_____51. Provide practice.

_____52. Analyze content of lesson in terms of elements of legibility.

Appendix K

Administration of Test Instrument and Instructional Sequence

ADMINISTRATION OF TEST INSTRUMENT
AND INSTRUCTIONAL SEQUENCE

GROUPS R_1 and A_1

1st day: Administration of pretest.

2nd day: Administration of programmed units.

Discussion of materials.
Distribution of materials.
Completion of Set 1 of Unit 1.
Discussion of Set 1 of Unit 1.
Continuation of Unit 1 during remainder of class period.

Assignment:

Complete first unit. Begin second unit. Record time begun and ended for each unit.

3rd day: Continuation of work on Units 2 and 3 in class.

Assignment:

Complete Units 2 and 3. Begin Unit 4.

4th day: Continuation of work on Unit 4 in class.

Assignment:

Complete Unit 4.

5th day: Administration of posttest.

GROUP A_2

1st day: Administration of pretest.

2nd day: Instruction in the teaching of handwriting provided by the investigator.

Assignment:

Chapter on handwriting in assigned language arts text. One article about handwriting in a professional text, journal, or teacher's manual to be read and critiqued.

3rd day: Laboratory period. Instruction in the writing of manuscript and cursive alphabet symbols and numerals. Practice in blackboard writing.

Assignment:

Work through exercises in Noble and Noble's Teacher's Manual.

4th day: Instruction in the teaching of handwriting provided by the investigator.

Assignment:

Complete chapter in assigned text.

5th day: Administration of the posttest.

GROUP A_3

1st day: Administration of pretest.

2nd day:
3rd day: Instruction in subject matter of Ed. 200.
4th day:

5th day: Administration of posttest.